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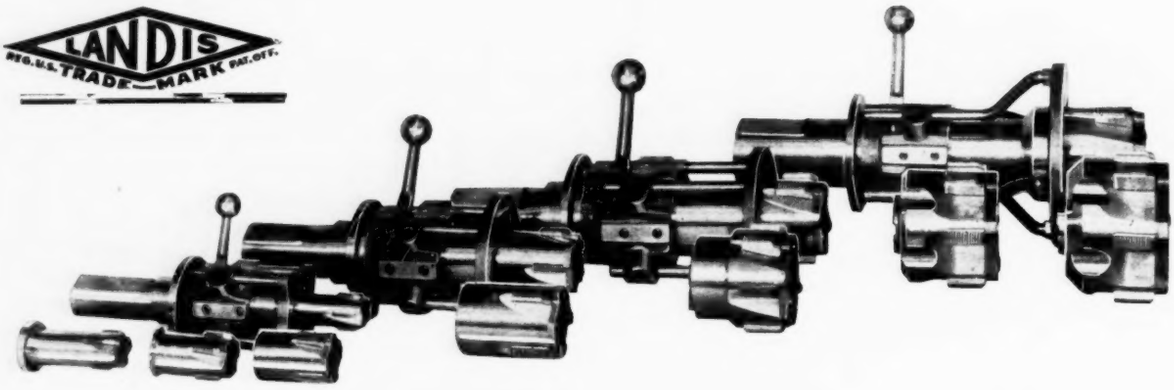

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As the Editor Views the News

NOW that the expected resignation of General Johnson has been submitted and accepted, and new committees have been appointed to administer NRA, the interested personnel of industry looks forward expectantly to signs which will indicate the attitude of the new leadership toward business now operating or attempting to operate under code provisions. If Mr. Richberg assumes a dominating role in the new set-up, it is reasonable to expect NRA to run more smoothly. Most executives found it easier to deal with him than with General Johnson. He works more quietly, is more methodical and is likely to pursue given policies more consistently.

• • •

To Right or To Left?

More important in the minds of many industrial executives is the question of whether the revamped NRA will continue to browbeat industry as in the past or whether it will attempt to work with industry to promote recovery. Of course this question embraces much more than NRA policy; it touches upon many other phases of the new deal. In brief, it is the question of whether the administration is turning to the left or to the right. Our guess is that the President is trying to lean to the conservative side, but does not want the public to know he is doing so.

• • •

Last Word in Street Cars

Operators of electric street railways, like their contemporaries in the railroad field, do not balk at tradition in their efforts to modernize equipment. At last week's convention of the American Transit association, the street railway executives demonstrated several new cars built to specifications of the Electric Railway Presidents' Conference committee. These cars are revolutionary in design and reflect significant application of the new USS Cor-Ten steel, a vanadium alloy steel and aluminum for trucks and bodies (p. 29) and rubber in combination with steel for wheels and other parts (p. 31) to reduce noise. These super-cars represent a remarkable achievement for co-operative research and development (p. 22) and are indicative of the sweeping departures from orthodox design which will mark the improvement of many other items of equipment during the next few years.

• • •

Tools vs. Abrasives

Two new developments in abrasives became important news last week. The Carborundum Co. announced a grinding wheel made from South African diamonds (p. 32) which facilitates the shaping and conditioning of cemented tungsten carbide tools. On Thursday, at annual meeting of the Electrochemical society in New York, Raymond R. Ridgway, announced the development by the Norton Co. of a new boron carbide (p. 43) which, approaching the diamond in hardness, is destined to supplant diamond powders for certain industrial applications. It has been used successfully in drilling tungsten alloy die nibs. These developments lend zest to the race between extremely hard tool materials and abrasives capable of shaping and dressing them. The rivalry is reminiscent of the old feud between projectiles and armor plate.

• • •

Big Week for Conventions

This is the most important convention week of the year for the metalworking industries. New York is host to the Sixteenth Annual National Metal congress and exposition, including meetings of the American Society for Metals, American Welding society, iron and steel division of the American Society of Mechanical Engineers, iron and steel and Institute of Metals divisions of the American Institute of Mining and Metallurgical Engineers, and the Wire association. The National Machine Tool Builders' association convenes in Atlantic City and the National Safety council holds forth in Cleveland. The scores of topics covered in the programs of these conventions interest thousands of executives and engineers. If you have overlooked these events, you still have time for an eleventh-hour dash to the convention of your choice, or you may read details of them in these pages.

E. L. Shaner

Richberg Heads New Recovery Setup; Board Governs NRA

Washington

DONALD R. RICHBERG'S position as chief adviser to the President in matters affecting the various relief and business-control agencies appeared to be strengthened Friday when the President, following the resignation of Gen. Hugh S. Johnson as NRA administrator Wednesday, reorganized the control of NRA and recast what has been considered his business cabinet.

In place of the industrial advisory board set up when NRA was created and which theoretically was superior to General Johnson, the President named a policy board of which Mr. Richberg, formerly chief counsel of NRA, is chairman, and on which also are Secretary of the Interior Ickes, Secretary of Labor Perkins, Harry Hopkins, federal emergency relief administrator, and Chester C. Davis, administrator of AAA.

Personalities Subdued

This committee of five, over which the President retains final jurisdiction as a matter of course, and of which Mr. Richberg is the "key" man, will co-ordinate and shape up policies for NRA, AAA and all other newly-created government agencies. Learning a lesson from the experience of the former advisory board, with which General Johnson's strong personality ran away, the new policy committee is expected to hold the reins tight.

Replacing General Johnson as NRA administrator and functioning as the administrative authority of NRA is an industrial recovery board, of which S. Clay Williams, former president of the Reynolds Tobacco Co., is chairman, Leon C. Marshall, labor specialist, is secretary, and Arthur D. Whiteside, head of Dun & Bradstreet's and former NRA division administrator; Walton H. Hamilton, Yale professor, and Sidney Hillman, president of the Amalgamated Clothing Workers, also are members.

The routine job of operating NRA falls to this board, which in turn is answerable to the policy committee under Mr. Richberg. Still a third board, to supervise judicial matters, was unappointed Friday. On it probably will be Attorney General Cummings, who is left off the policy committee, and a representative of the federal trade commission.

In his first statement Friday, Mr. Richberg stated that neither he personally nor the policy committee will run NRA, and that this will be done by the new industrial emergency committee. In the last analysis, of course, the board is subject to the committee, and over the committee the President holds the veto power.

To Set No General Policy

It was, however, stated by Mr. Richberg that no sudden or sweeping changes will be made in NRA. The question of price fixing and industrial control will be taken up separately for each industry, he said, and no general policy will be drawn.

Referring to General Johnson, with whom Mr. Richberg and Secretary Perkins were said to have broken, Mr. Richberg maintained Friday that he agreed with the general on reorganization and any differences were in regard to methods and personnel.

The feeling in Washington at the close of last week was that the President's "fireside" radio talk Sunday evening, Sept. 30, would develop the future policy of NRA. The attitude of Mr. Richberg is that codes should be simplified and stripped of legal verbiage (he himself is a lawyer!) price and production control measures should be jettisoned, leaving trade practice provisions and wage and hour regulations as the main portion of NRA.

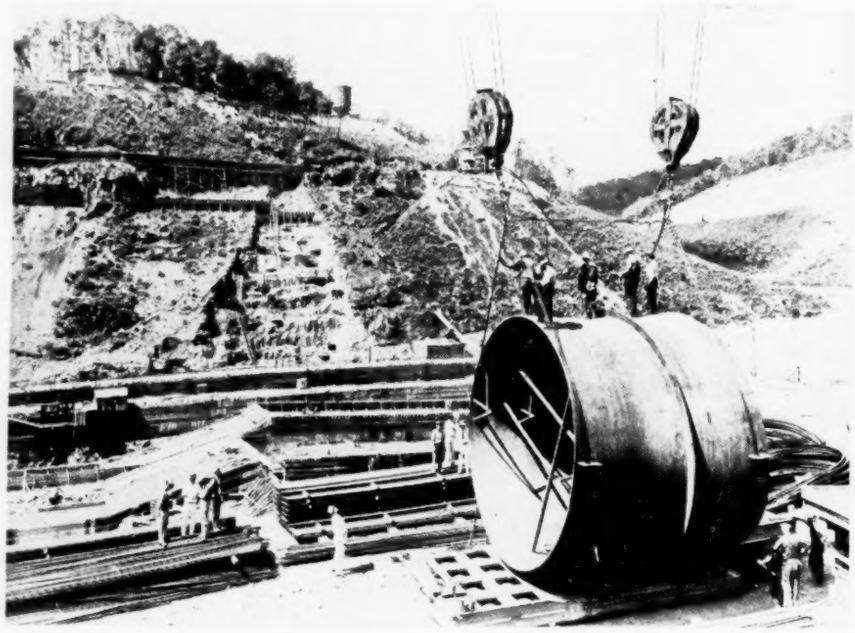
Institute

PROTESTS from fabricators greeted the appearance of regulations No. 9 of the American Iron and Steel institute last week covering sales of plates, shapes and bars for fabrication for identified projects, and compelling fabricators to submit bills of lading before receiving final rate adjustments under the fabrication-in-transit privilege.

They assert the new rulings place an undue cost burden upon them in capital tied up and extra clerical work. The cost, they claim, is too heavy for the reforms hoped to be accomplished. The regulations are scheduled to become effective Oct. 10.

The institute takes the position that while published freight rates provide certain charges for the privilege of fabrication-in-transit, such charges are not in all cases the same and that, therefore, if producers shall be required to include such charges in the delivered prices, unfair competitive conditions may be created among members of the steel code and among fabricators.

Effective Oct. 1, are amendments to resolutions No. A13, regarding the allowance of freight charges on prod-



STEEL HELPING TO RECLAIM TENNESSEE VALLEY: First section of the two penstock tubes at the Norris dam, being lowered into place at the dam, which is part of the TVA development. Each section of these tubes is 20 feet in diameter and each of the two tubes will be over 300 feet long. Wide World Photo

ucts sold to the federal government, or a department or division thereof, when shipped by all-rail transportation, and reductions in delivered prices for products so sold.

Transportation

INTERSTATE commerce commission, which Monday, Oct. 1, inaugurates its hearing on the petition of railroads for freight rate increases, amounting for most iron and steel products to 10 per cent or a maximum of 2c per 100 pounds, is expected to bunch the testimony of iron and steel shippers. At the outset, the railroads will support their demand for higher rates.

Last week the American Institute of Steel Construction formally lodged a protest with the ICC against increases as they affect both plain and fabricated material and the stopover charge in fabricated-in-transit clauses. The Independent Steel Fabricators' association, Pittsburgh, and Steel Plate Fabricators' association, Chicago, are also protesting. Individual protests have been filed by the Republic Steel Corp., Youngstown Sheet & Tube Co., Otis Steel Co., and East Penn Foundry Co., Macunzie, Pa.

RAILROAD GROUPS COMBINE

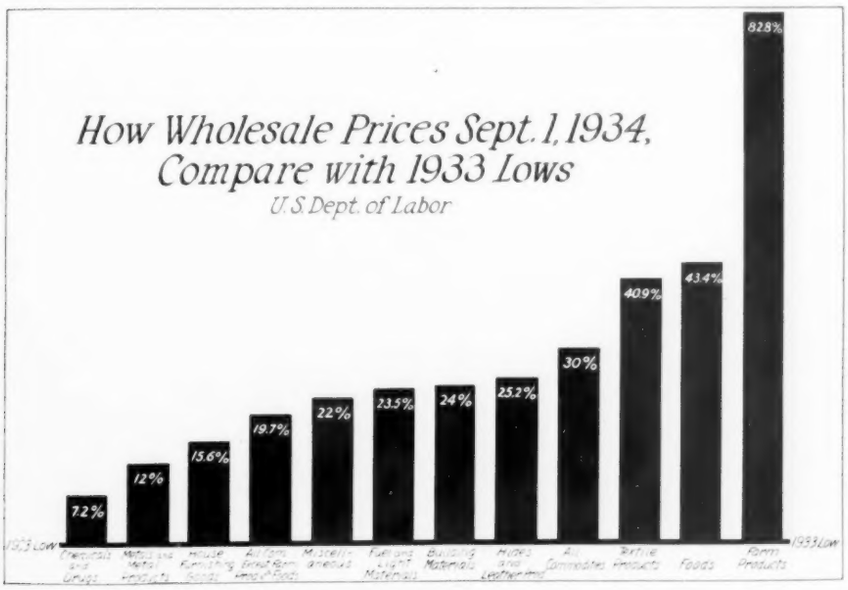
Association of American Railroads is the new organization formed by the consolidation of the American Railway association and the Association of Railway Executives for the purpose of creating an independent body to act for the carriers as a whole in important matters pertaining to the industry. The association was formed at a recent meeting at Chicago. Headquarters will be at Washington with J. J. Pelley, recently president of the New York, New Haven & Hartford railroad, as president. He is resigning the former office.

The board of directors includes: Gen. W. W. Atterbury, Pennsylvania; J. J. Bernet, Chesapeake & Ohio; L. W. Baldwin, Missouri Pacific; W. R. Cole, Louisville & Nashville; L. A. Downs, Illinois Central; Carl R. Gray, Union Pacific; Hale Holden, Southern Pacific; Fairfax Harrison, Southern; H. A. Scandrett, Milwaukee; Fred W. Sargent, Chicago & North Western; Daniel Willard, Baltimore & Ohio; F. E. Williamson, New York Central; and Ralph Budd, Burlington.

PWA

A STUDY by the bureau of labor statistics of all PWA allotments shows $414,000,000 worth of materials were ordered for use on PWA projects and that 1,100,000 man-months of primary indirect employment were created in factories manufacturing these materials in the first year of the program which has just ended.

Included among materials ordered were $17,000,000 worth of rails, $63,000,000 worth of steel other than rails, $45,000,000 worth of foundry and machine shop products, and $34,000,000 worth of freight cars.



IRON AND STEEL PRICE RISE IS MODEST: A comparison by the department of labor of present wholesale prices (for iron and steel this means the going market at the mill) with their 1933 *lows shows that only chemicals and drugs have had a smaller increase than metals and metal products, which include both ferrous and nonferrous products. The rise in farm products has been almost seven times that of metals. The average increase of all commodities being* 30 *per cent, metals could have a rise of* 18 *points and not be abnormal in relation to the low of* 1933

Labor

NATIONAL steel labor relations board, which was drafted last week to assist in quelling unrest in the textile industry, announced hearings affecting some of the largest producers of iron and steel.

It has scheduled the following hearings for the federal building in Pittsburgh: Oct. 2, Carnegie Steel Co. Duquesne plant; Oct. 3, Carnegie Steel Co. McDonald plant, and Oct. 4, Jones & Laughlin Steel Corp.

The Carnegie hearings are on requests for an election to determine representatives for collective bargaining. The Jones & Laughlin hearing is an outgrowth of a charge the company is attempting to break up an Amalgamated association lodge.

APPROVES PENSION PLAN

Acklin Stamping Co., Toledo, O., has adopted an employe retirement program. Normal retirement age has been fixed at 65 years for men and 60 for women. Special arrangements have been made so that none of the older employes will retire on less than $25 a month. Retirement annuities, based on future service and payable at normal age, will amount to 1½ per cent of total salary received after adoption of the plan.

Safety awards were presented to the following companies at a dinner held by the Chicago safety council Sept. 25: James B. Clow & Sons, Western Electric Co., Victor Chemical Works, and Youngstown Sheet & Tube Co., South Chicago, Ill. These plants established the best records for safety in their respective groups in the inter-plant accident prevention contest conducted by the council.

STEEL HOLDS EMPLOYMENT

While steel production declined 14 per cent in August employment was off only 5 per cent and payrolls less than 2 per cent, according to the American Iron and Steel Institute. Total employment in August was 404,793, total payroll $34,362,208, average hours per week worked by wage earners were up fractionally to 25. Average earnings per hour increased to 63.5 cents, only slightly less than the all time record of 64.8 cents in April, 1934.

Washington

SIGUA MANGANESE CORP., New York, has filed registration statement with the securities and exchange commission under the securities act setting forth the fact that it was organized May 31, 1934, to develop and mine manganese claims and to conduct a general manganese mining and sales business in Cuba.

A $250,000 issue of common stock is proposed, 25,000 $10 per shares to be offered at par. The company's

officers are: Luis Bartile, Santiago, Cuba, president; W. Albanos, Holguin, Cuba, vice president; and E. Mora, New York, secretary-treasurer.

¶State department is now starting to negotiate a trade agreement with Spain, following conclusion of a treaty with Cuba and a start on an agreement with Sweden. In 1929, Spain took 14,922 tons of scrap from the United States, but in 1933, only 51 tons.

Meetings

KING LEOPOLD III of Belgium has continued the tradition of the Belgian royal family by accepting nomination as an honorary member of the British Iron and Steel institute, whose general meeting was held in Brussels, Sept. 10-11.

Leon Greiner, director and general manager of Societe Anonyme John Cockerill, Liege, and Aloyse Meyer, general manager of ARBED, Luxemburg, have been nominated honorary vice presidents of the Institute.

It was announced that the council was proposing Sir Harold Carpenter for election as president at the annual meeting of the institute in May, 1935, and that it had elected James Henderson, deputy chairman and general manager of the Appleby Iron Co. Ltd., and of the Frodingham Iron & Steel Co. Ltd., and president of the British Iron and Steel Federation, to be honorary treasurer of the institute in succession to Sir Harold Carpenter, who is resigning at the end of September.

The date of the 1935 meeting was fixed at May 1 to 3, and the annual dinner for May 2.

¶Saving of power costs, reflecting the need of modernization and replacement of old and obsolete equipment, will be the keynote of the eleventh national exposition of power and mechanical engineers at the Grand Central Palace, New York, Dec. 3-8. Concurrently, the American Society of Mechanical Engineers will hold its sessions in the engineering society's building, New York. Charles F. Roth, Grand Central Palace, New York, is in charge of the exposition.

MAKES WINTER SCHEDULE

Chicago chapter of the American Society for Metals has completed its calendar for the 1934-35 season, including in addition to monthly meetings an educational course and plant inspection trips. At the monthly meeting Oct. 11, E. W. Stewart, of the William D. Gibson Co., Chicago, will speak on "Springs and Spring Materials." The chapter staged its annual golf tournament Sept. 8.

¶Refrigerating Machinery association, 915 Southern building, Washington, will hold its annual meeting at Stevens hotel, Chicago, Oct. 22.

NRA

HEARING will be held at the Willard hotel, Washington, Oct. 2, on petition of those scrap iron dealers who signed the President's re-employment agreement before the scrap iron code became effective, and hence are operating under a wage rate handicap. Under the PRA these dealers are paying 37½ cents per hour and have been unable to reduce their rates to the 32½ cents an hour in the scrap code.

Iron and steel scrap interests concerned with the successful operation of their code have recently taken exception to methods being worked out to defray administration expenses. Frank B. Crockard, deputy code administrator, has backed a plan that assessments be made to signatory firms on the basis of gross volume of business.

However, it is pointed out that gross volume of business may be construed to include both purchases and sales, that it might include paid freight charges, and that owing to price variations in different districts, some markets would be unduly discriminated against.

Those opposed to the deputy code administrator's plan have recommended that expenses should be based on the gross tonnage sales of an individual concern, with due regard for a graded plan, similar to the procedure last used by the Institute of Scrap Iron and Steel for budget expense assessments.

RIVET CODE APPROVED

Code for the tubular split and outside pronged rivet industry, a division of the fabricated metal products manufacturing and metal finishing and metal casting industry, has been approved. Hours and wages are the same as in the master code for the fabricated metal products manufacturing industry, or 40 cents an hour for men and 35 cents an hour for women in the North and 5 cents less in the South.

¶Code authority for the malleable iron industry has petitioned for a modification to permit making expenditures called for under a budget to be provided by assessment.

¶Code authority for the steel plate fabricating industry has asked NRA approval of a uniform method of cost accounting to be used in estimating the costs below which sales are forbidden. Deputy Administrator Walter G. Hooke has announced that any comments on the proposed system must reach him before Oct. 3.

The headings of the proposed system are: Material and freight, drafting, labor, works expense and general overhead, erection labor, erection expenses and erection general expenses. Each of these headings is precisely defined in the proposed system.

CODE AUTHORITIES APPROVED

Road machinery manufacturing industry, co-ordinating agency: S. F. Beatty, president Austin-Western Road Machinery Co., Aurora, Ill.; W. R. Adams, vice president, J. D. Adams Co., Indianapolis.; C. O. Weld, vice president, Caterpillar Tractor Co., Peoria, Ill.; J. L. Connors, vice president, Galion Iron Works, Galion, O.; W. A. Roberts, general sales manager of tractor division, Allis Chalmers Mfg. Co., Milwaukee; and Jack B. Haile, manager of the road machinery division of Garwood Industries, Detroit. The latter is non-association member.

¶Approval also was given to I. A. Larsen, of Lima, O., and G. H. Olsen, of Chicago, succeeding C. A. Owens and W. S. Ramsay as member of the code authority of the shovel, dragline and crane industry.

Production

GAINS in the Chicago, Pittsburgh, Youngstown, New England, Wheeling and Buffalo districts increased the national steelmaking rate 2½ points last week to 25 per cent, highest for September. Indications point to a further rise this week. Details for various districts follow:

Youngstown—Up 2 points to 28 per cent last week, and the rate is expected to go to 29 per cent this week due to the starting of an idle bessemer furnace.

Chicago—Increased 4 points to 26 per cent, the highest rate of September. Blast furnace schedules were unchanged last week, however, with 8 of 36 steelworks stacks active. Future operating changes are expected to be small.

A rush order has made it necessary for all hot mills at the tin plate plant at Elwood, Ind., to be placed in operation. For several weeks the mills have been operating on a three-day week schedule.

New England—As predicted, operations were at 31 per cent last week, a gain of 3 points. Another open hearth is expected to go on this week, lifting ingot output several points.

Pittsburgh—Gained 1 point to 17 per cent, marking the third successive weekly improvement in steelmaking schedules in this district. Another slight improvement this week will place the average of operations at 18 per cent.

Several of the smaller independents are operating at probably higher rates than those of the two leading interests. No change has occurred in the number of active steelworks blast furnaces here, with a to-

tal of 14 out of 60 being in blast. Nine of that number are being operated by subsidiaries of United States Steel Corp., and five among three independents.

Mercer Tube & Mfg. Co., Sharon, Pa., will resume operations Oct. 8 on a double-turn basis as the result of the completion of its inventory period and an accumulation of orders. The Mercer company produces butt-weld steam and water pipe in sizes from ¼-inch to 3-inch.

Detroit—Unchanged at 77 per cent through last week. Thirteen of 17 steelmaking units are on schedule, one district plant operating four furnaces and the other nine.

Wheeling — Advanced 5 points to 31 per cent last week, with 12 open-hearth furnaces out of 39 active, a net gain of 2 over a week ago. The outlook for this week is encouraging and steelmaking operations will probably hold at 31 per cent.

Buffalo—Up 3 points last week to 24 per cent, and this rate is expected to hold this week. Nine out of 38 open hearths are operating. Reports of large orders having been booked from the automotive trades for delivery this quarter are current, but these lack official confirmation.

Birmingham — Held at 25 per cent last week. The rolling of 2000 tons of rails the past week did not develop any further strength in ingot production, steel being carried from Fairfield to the Ensley rail mills. Several open-hearth furnaces are ready for quick resumption, in case there is demand for steel.

Central eastern seaboard — Unchanged at 17 per cent last week, with some gain expected this week. Steelmaking still is in excess of finishing operations.

Cleveland-Lorain — Unchanged last week at 28 per cent, National Tube Co., Lorain, continuing with six open hearths; Corrigan, McKinney Steel Co. with three and Otis Steel Co. two. These units also are scheduled for this week.

CANADA MAKES MORE IRON

Pig iron production in Canada in August totalled 41,485 tons, a 13 per cent increase over the July output of 36,759 tons, and an 18 per cent increase over the August, 1933, production of 35,233 tons. Foundry grade advanced from 3620 tons in July to 7831 tons in August, and malleable grade increased from 2800 tons to 4810 tons. Basic grade made for the further use of the producers declined from 30,339 tons to 28,844.

Production of ferroalloys in August amounted to 2458 tons, compared with 2483 tons in July and 1796 tons in August, 1933.

August output of steel ingots and direct steel castings totalled 63,504 tons, a 5 per cent decline from the July total of 66,647 tons.

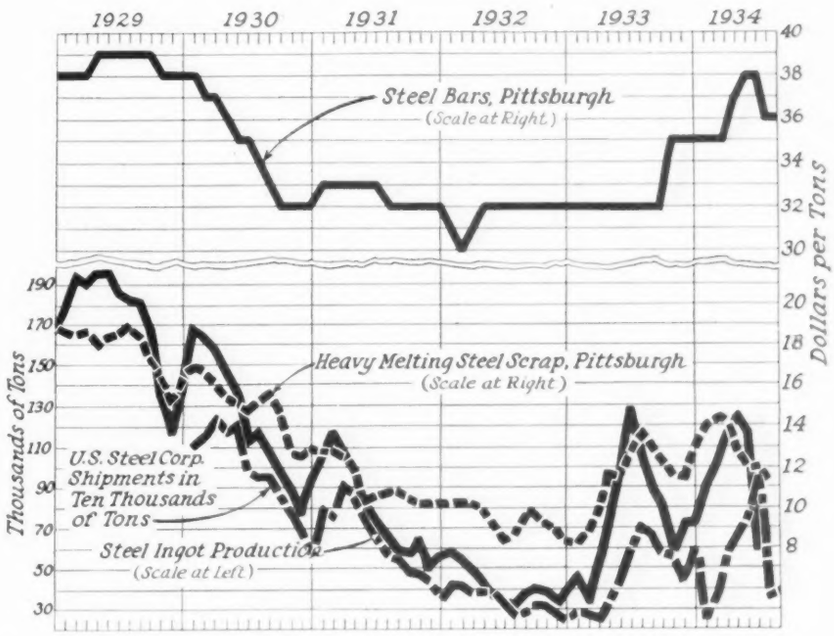
Financial

STANDARD STATISTICS CO. INC., New York, has issued a formal statement advising Republic Steel Corp. stockholders to accept the merger and recapitalization proposals and deposit their deferred stock. This results from an investigation of the merits of the proposed merger of the Corrigan, McKinney Steel Co., Cleveland, and Truscon Steel Co., Youngstown, O., with Republic.

"Recapitalization of the company," says the analysis, "will permit immediate retirement of an existing mortgage, terms of which preclude any dividends for an indefinite period, will strengthen the liquid financial position, and reduce senior equity claims. These advantages, it is believed, will more than offset the increase in fixed charges and possible later dilution in equity.

"Longer term advantages of merging with Corrigan, McKinney include economies to be effected by combined operations, and acquisition by Republic of large ore reserves, finishing facilities at Detroit and large primary capacity directly on the Great Lakes. Recent results would indicate, however, that present earning power of Corrigan-McKinney will support its proportion of Republic's proposed capitalization. The Truscon acquisition seems favorable, considering that company's earnings record; affiliation with Re-

More Comparisons on Scrap as Market Barometer



MUCH interest being manifested in the chart presented in STEEL, *Sept. 10, page 13, in which prices of heavy melting steel at Pittsburgh and daily average production of steel ingots were compared to determine to what extent changes in scrap were a barometer of impending changes in ingots, further comparisons have been made.*

In the accompanying chart STEEL *has also charted shipments of finished steel by the United States Steel Corp., and the price of steel bars at Pittsburgh. Thus the movements of these four factors can be seen to determine the extent scrap prices antedate changes in the others.*

There seems to be a relation between the movement of scrap prices and of finished steel prices. Thus, in 1929 scrap prices declined in July and bars in October. In 1930 scrap went down in January and bars in February, scrap up in November and bars in December. In 1931 scrap went down in March and bars in July. In 1932 and 1933 prices were fairly level but a slight rise in scrap in August, 1933, was followed by bars in October, and a further rise in scrap in November preceded a rise in bars in March, 1934. In 1935 scrap declined in February and bars in June. In January, 1932, bars made a sharp dip for two months and then regained the old level, while scrap prices maintained an almost level rate.

In this comparison scrap predicted movements in finished steel prices by one to four months, both upward and downward. The sharp dip in bars early in 1932 apparently was not related to the general market condition, as scrap showed no sign.

Shipments of finished steel by the United States Steel Corp. follow practicaly parallel to the line of ingot production at a month or two later, as processing is completed. Shipments by the Steel corporation are the only finished steel statistics available and they are believed to represent the industry generally with fair accuracy.

public should be mutually beneficial.

"Both classes of Republic's stockholders are called upon for some sacrifice. Preferred shareholders will receive book value slightly exceeding present claims, and securities having slightly higher market value. The common stockholder, though giving up a substantial part of present equity, is compensated by likelihood that his reduced equity will actually be stronger, of potentially good earning power, and likely to receive dividends at a relatively earlier date."

¶Directors of the McKinney Steel Holding Co. last week also recommended that shareholders approve the sale of the Corrigan, McKinney Steel Co. to the Republic Steel Corp.

¶Arthur Roeder, president and trustee in bankruptcy for the Colorado Fuel & Iron Co., Denver and Pueblo, Colo., has been ordered by the federal district court in Denver to submit plans for reorganization by Feb. 1.

Iron Ore

QUICKENED by studies being made by the Tennessee Valley Authority, Knoxville, Tenn., of the possibility of utilizing the South's deposits of iron ore with the aid of cheap electric power, the Tennessee division of geology, Nashville, Tenn., under the direction of Walter F. Pond, state geologist, has issued bulletin 39 describing the brown iron ores of the western highland rim of Tennessee. In this region, long a producer of brown iron ore, special grades of pig iron, including charcoal, high silicon and ferrophosphorus have been made. Production of iron ore in this part of Tennessee from 1797 to 1930 has been about 8,560,000 gross tons, and of pig iron 4,052,500 tons.

ORIGIN OF AUGUST IMPORTS

Gross Tons

	Pig iron	Manganese ore	Ferromanganese
Netherlands	11,751	.....	.....
Norway	1,084	.....	1,010
Sweden	300	.....	.....
United Kingdom	50	.....	161
Kwantung	59	.....	.....
British India	5,135	1,040	.....
Cuba	.....	6,775	.....
Brazil	.....	3,957	.....
Gold Coast	.....	6,394	.....
France	.....	.....	14
Italy	.....	.....	33
Canada	.....	.....	600
Total	18,479	18,166	1,818

	Sheets, skelp and sawplates	Structural steel	Steel bars	Hoops and bands
United Kingdom	2	16	32	243
Belgium	548	1,819	1,049	1,139
France	1	426	183	433
Germany	12	216	111	491
Sweden	13	.....	290	17
Canada	.....	.....	6	.....
Austria	.....	.....	4	.....
Total	576	2,477	1,675	2,323

August Imports Up; Exports Gain Less

IMPORTS of iron and steel into the United States in August increased slightly more than exports, thereby making the trade balance a little less favorable than in July, according to the iron and steel division of the department of commerce, Washington.

August imports, totaling 32,418 tons, were more than half pig iron, this item totaling 18,418 tons. Next was structural shapes at 2480 tons, and hoops and bands at 2323 tons. Imports in the first eight months total 217,732 tons, compared with 251,904 tons in the comparable period of last year.

Exports at 242,947 tons compared with 233,186 in July. Scrap again led with total shipments of 155,542 tons. In eight months exports of scrap have totaled 1,050,202 tons, or more than double the 464,117 tons shipped out in the same period of 1933. Next largest export was tin and terne plate at 11,227 tons. For eight months exports total 1,729,307 tons, against 725,404 tons a year ago.

FOREIGN TRADE OF UNITED STATES IN IRON AND STEEL

Gross Tons

	1934		1933	
	Imports	Exports	Imports	Exports
Jan.	22,653	178,023	21,892	56,720
Feb.	25,407	151,184	19,748	63,936
Mar.	38,393	261,269	22,114	80,567
April	26,862	201,539	28,061	100,395
May	29,465	241,753	26,295	123,069
June	24,858	219,406	34,368	102,581
July	17,676	233,186	52,805	83,311
Aug.	32,418	242,947	46,839	119,374
8 mo.	217,732	1,729,307	251,904	725,404
Sept.	.....	.....	55,706	108,799
Oct.	.....	.....	46,673	164,755
Nov.	.....	.....	28,979	157,600
Dec.	.....	.....	31,310	184,585
Total	.....	.....	414,790	1,350,692

UNITED STATES IMPORTS OF IRON AND STEEL PRODUCTS BY COMMODITIES

(In Gross Tons)

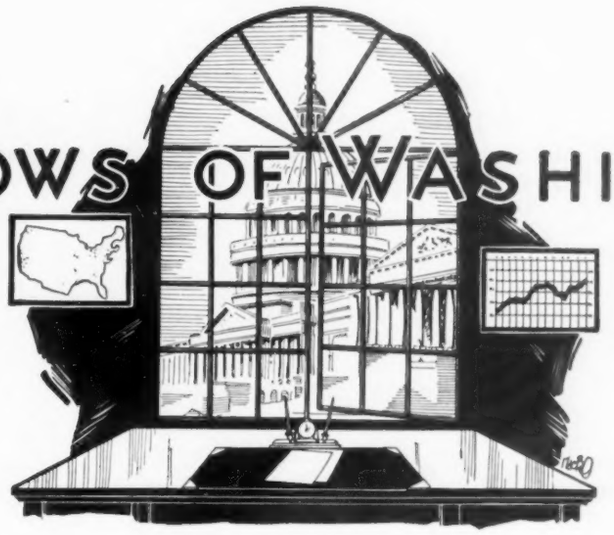
Commodity	August 1934	July 1934	August 1933
Pig iron	78,418	2,997	18,488
Sponge iron	1	53	100
Ferromanganese, spiegeleisen	1,818	2,551	4,889
Ferrochrome	2	31	.....
Ferrosilicon	20	46	28
Other ferroalloys	.....	.....	.....
Scrap	1,025	933	9,508
Steel ingots, blooms, etc.	290	35	121
Concrete bars	142	336	99
Hollow bar, drill steel	.....	131	54
Merchant and other steel bars	1,675	1,881	1,518
Iron slabs	.....	.....	.....
Iron bars	111	163	53
Wire rods	720	791	1,174
Boiler and other plate	54	47	35
Sheets, skelp, saw plate	576	378	861
Tin plate	11	15	9
Structural shapes	2,480	1,665	2,894
Sheet piling	.....	.....	.....
Rails and fastenings	225	254	1,184
Cast iron pipe, fittings	29	4	148
Welded pipe	39	154	369
Other pipe	285	104	176
Barbed wire	830	1,098	347
Round iron, steel wire	187	315	378
Telegraph, telephone wire	19	.....	10
Flat wire, strip steel	245	132	168
Wire rope, strand	170	166	179
Other wire	71	131	189
Hoops and bands	2,323	1,868	3,303
Nails, tacks and staples	428	1,198	379
Bolts, nuts, rivets	19	1	18
Horse and mule shoes	10	37	35
Castings and forgings	195	161	125
Total	32,418	17,676	46,839

UNITED STATES EXPORTS OF IRON AND STEEL PRODUCTS BY COMMODITIES

(In Gross Tons)

Commodity	August 1934	July 1934	August 1933
Pig iron	285	61	412
Ferromanganese, spiegeleisen	26	2	3
Iron and steel scrap	155,542	155,812	70,145
Ingots, blooms, billets, slabs and sheet bars	65	79	699
Bars, iron	115	47	47
Bars, steel	2,676	2,488	2,493
Bars, alloy steel	116	136	135
Wire rods	1,414	576	1,268
Boiler plate	108	12	52
Other plate, not fabricated	3,421	3,622	868
Skelp, iron or steel	8,770	9,665	1,184
Iron sheets, galvanized	103	113	78
Steel sheets, galvanized	6,398	5,551	3,091
Steel sheets, black	8,568	7,600	2,945
Iron sheets, black	527	879	354
Strip steel, cold rolled	403	1,092	827
Hoop, band, scroll iron or steel	1,437	1,464	1,112
Tin plate or terne plate	11,227	13,960	7,333
Water, oil, gas, and ether tanks, ex. lined, etc.	394	430	154
Structural shapes, not fabricated	3,251	2,663	2,594
Structural shapes, fabricated	1,690	947	1,144
Plates, fabricated, punched or shaped	247	83	41
Metal lath	83	69	83
Frames, sashes, piling	146	58	97
Rails, 50 pounds	5,431	3,391	2,490
Rails, under 50 pounds	817	838	461
Rail fastenings	606	458	760
Switches, frogs and crossings	368	101	75
Railroad spikes	193	330	290
Railroad bolts, nuts, washers, nut locks	66	87	55
Boiler tubes, seamless	1,055	368	337
Boiler tubes, welded	25	28	16
Casing and oil-line pipe, seamless	7,366	4,449	1,214
Casing and oil-line pipe, welded	439	339	133
Seamless black pipe, other than casing, etc.	486	196	94
Malleable iron screwed pipe fittings	322	246	229
Cast iron screwed pipe fittings	166	136	91
Cast iron pressure pipe and fittings	1,931	416	347
Cast iron soil pipe and fittings	172	160	643
Welded black steel pipe	1,640	1,465	1,568
Welded black wrought iron pipe	266	102	58
Welded galv. steel pipe	2,083	1,940	2,278
Welded galv. wrought iron pipe	84	63	50
Riveted iron or steel pipe and fittings	79	52	20
Plain iron, steel wire	1,440	1,449	1,447
Galvanized wire	2,092	1,792	1,873
Barbed wire	3,630	2,923	3,672
Woven wire fencing	122	110	135
Woven wire screen cloth	133	83	71
Wire rope	158	248	181
Other wire and mfrs.	323	444	298
Wire nails	996	809	1,442
Horseshoe nails	40	52	60
Tacks	38	57	55
Other nails, including staples	409	291	336
Ordinary bolts, mach. screws, nuts rivets and washers	463	427	240
Iron castings	591	711	495
Steel castings	173	231	91
Car wheels and axles	1,292	491	392
Horseshoes	21	9	47
Iron and steel forgings, n. e. s.	419	395	171
Total	242,947	233,186	119,374

WINDOWS OF WASHINGTON



WASHINGTON

APPOINTMENT of policy and administrative boards for NRA appears to be only so much window dressing calculated to leave the impression that one man control of NRA has come to an end.

The fact is, Donald R. Richberg will have the last word and for all practical purposes he is the heir of and successor to Gen. Hugh S. Johnson.

The question, then, for industry is whether Mr. Richberg is an improvement over General Johnson. A great majority of businessmen who have contacted NRA in the past 15 months would say yes, and this includes iron and steel executives who have sat with him on the steel code authority.

When Mr. Richberg came to Washington as chief counsel of NRA he was cataloged as a labor man. He had made his reputation—and it was a good one—by championing the cause of railroad labor.

But industry found that instead of dealing with a rough and tumble labor attorney it was associating with a dignified, suave barrister who by contrast with General Johnson was the acme of poise. A great many would clasisfy Mr. Richberg as no more than liberal instead of as radical.

WANTS CODES SIMPLIFIED

If the future can be read from the past, an entirely new era in regard to codes is at hand. Mr. Richberg has been unequivocal in his attitude that codes should be simplified, price control features generally eliminated, and that wage and hour provisions for labor and trade practice regulations be the residue.

Only ten days ago, speaking in Baltimore, Mr. Richberg delivered a scorching criticism of the steel code. He attacked it as being too complicated because lawyer-written, costing a half million dollars a year, and creating a bureaucracy.

From the fact that the steel code authority has "taken it," the impression has gone abroad that the criticism was not entirely unwelcome. There appear to be a good many in the steel industry who believe that the code's language is too complicated, that the price filing provisions are unworkable, and the cost of the code will run nearer a million than a half million dollars annually.

The immediate outlook is that an era of code simplification and enforcement is at hand. Even NRA enthusiasts concede that enforcement has reached a state where complete disintegration threatens. A good deal of the withholding of business is traceable to the widespread belief of consumers that codes are about to be abandoned and hence free markets again obtain.

COAL CODE TOTTERING

In the case of coal, the situation has reached probably the most serious condition. Industrial buyers have held back their requirements for slack grades to the extent that dumps and material on track at the mines have reached the point where mining of other grades has become impossible. A decision either way on code enforcement appears preferable to the indecision of the past 60 days.

In a way, the reorganization of NRA under Mr. Richberg should not be taken too seriously, and perhaps should be regarded as a stop gap. By law, NRA expires next June 16 and it is up to the congress convening in January to extend or revise it. The most voluminous and possibly also acrimonious debate on any economic subject in recent years is in prospect.

It may be the new policy and administrative boards can reorganize NRA and shape up a legislative policy that will be acceptable, but the chances are against it. Labor has tasted blood, believing that it is responsible for General Johnson's resignation and regarding it as a victory that control of working conditions in the textile industry has been transferred from NRA to the new textile board.

Industry becoming vocal through the numerous meetings, many of them secret, to formulate a program, may be expected to try to diminish NRA control. Friends of the antitrust laws, like Senator Borah, may be counted upon to oppose any further armistice on their enforcement.

Meanwhile, other cross purposes will be at work. The department of justice would like to regain full ascendency over the antitrust laws. Secretary Perkins is jealous of dominace over wages and hours of work, and if she cannot obtain this for her own department of labor she would rather see it lodged in the new labor boards than continue in NRA. The federal trade commission claims priority to trade practices.

So, unless Mr. Richberg, backed up by his new boards, can refurbish NRA to a satisfactory degree between now and Jan. 3, his work may be only temporary.

F.D.R. STILL MANEUVERING

The famous simile of the President attempting to ride, bareback, two horses running in opposite directions still holds true. In this reorganization of NRA he was confronted with the problem of appeasing both labor and industry, as well as continuing to further recovery and effect reform.

The American Federation of Labor, opening its annual convention at San Francisco this week, was poised to demand the resignation of General Johnson. This of course the President has forestalled.

At the same time, he was increasingly persuaded to re-enlist the cooperation of industry. Exceedingly sensitive to trends, the President has become aware in the past month that the objections of industry to his recovery program were more than merely surface or political manifestations.

He is represented as still feeling

that the slump in business last summer and this fall, exceeding seasonal proportions, resulted from the resistance of business to NRA and that instead of looking to Washington for leadership, business needs only to fill in the framework already supplied by Washington.

There is reason to believe that the President is somewhat irritated over demands for his position on balancing the budget, further deflation of currency, and other fundamental policies. In fact, the new dealers in Washington are generally much more resentful of criticism of the administration than they were in the spring.

Probably an accurate appraisal of General Johnson's attitude toward labor and toward industry will never be possible. At the outset of his colorful regime, he appeared to be hostile to industry and at the close to have reversed this position.

Certainly, his criticism of the Amalgamated Association of Iron, Steel and Tin Workers last June, when it was threatening to strike, marked a definite parting with labor, which was cemented in his recent attack upon the textile strikers.

It remains to be seen who will replace the General as a target for "dead cats" and other criticism of the new deal. Certainly he parried much criticism that otherwise would have lodged in the White House or other departments.

Would Cut Storage Rate On Foreign Iron at Boston

Lower storage charges on imported pig iron at Boston have been proposed by the New England Freight association, the charges to apply on car lots unloaded direct from vessels to cars on piers of the Mystic Terminal Co. and on which the Boston & Maine railroad is to receive a revenue road haul.

The proposal would establish a charge of 55 cents per gross ton for storage on open ground, this charge to cover switching from vessels, reloading into cars and also includes the first month's storage.

The proposal also includes a 12-cent charge per gross ton per month for shipments stored in cars, with 12 cents per ton for each succeeding month whether stored in cars or on the ground. The reason for the storage rate proposed is to establish an arrangement similar to that now in effect at Baltimore.

With imported pig iron already an important factor in New England territory with facilities for storage at ports near consuming areas, including Providence, R. I., Bridgeport, Conn., Boston and with a possibility of Portland, Me., being added, the proposed lower storage charges at Boston would give importers additional advantage in the territory.

Here and There In Industry

PITTSBURGH TIN PLATE CO., McKeesport, Pa. through its subsidiary, Metal Package Corp., has acquired the National Can Co., Boston, which is a manufacturer of a general line of tin cans for commercial purposes.

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LeRoi Co., West Allis, Wis., has taken a government order for 206 five-kilowatt gasoline engine generator sets for lighting CCC camps. The contract totals about $60,000.

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Joseph T. Ryerson & Son Inc., Chicago, is enlarging its warehouse in Jersey City, N. J., to provide additional space for fine and specialty steels.

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American Car & Foundry Co., New York, has placed an order with the Timken Roller Bearing Co., Canton, O., for bearings and boxes for an eight-car high speed streamlined steam train which it is building for the Baltimore & Ohio railroad at its St. Charles shops.

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Washington Gas Coal Co., Washington, Pa., has had M. W. McClane of Washington, appointed temporary receiver on the petition of the Peoples Pittsburgh Trust Co., Pittsburgh. Operation in the mine will continue pending foreclosure proceedings by mortgage bond holders totaling $171,000.

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Northern Blower Co., West Sixty-fifth street and Barberton avenue, Cleveland, dust and fume recovery engineer, has taken a contract from Bunting Brass & Bronze Co., Toledo, O., for a complete fume recovery system for its furnaces. The installation is to be in operation within the next few weeks.

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Ferro Enamel Corp., Cleveland, manufacturer of porcelain enamels and porcelain enameling supplies, has created an export department to handle world-wide trade not already covered by its branches in Canada, Holland, England and France. A new trade mark for use by Ferro Enamel and all its subsidiaries has been adopted.

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Precision Machine Co. Inc., Milwaukee, reports a decided pickup in demand for small parts from the motion picture projector and camera manufacturing industries. Electrical lines also are improving, and makers of small home tools also are ordering parts in preparation for holiday trade. The Precision company specializes in small gears and also makes counting devices. Its products range from parts for watches to units entering into the construction of moderate sized industrial equipment, such as drill presses and lathes. For this reason, according to Arthur Papke, works manager, its volume of business may be taken as a barometer of industrial conditions generally.

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A. O. Smith Corp., Milwaukee, is making delivery of four oil cracking units to the Asiatic Petroleum Corp. for Royal Dutch Shell Co. plants at Rouen and Pouillac, France. The Smith corporation has done previous work for the Asiatic corporation but this is the first order for that concern's plants in France. Two of the stills are ten feet in diameter and 35 feet long, the smaller being six feet in diameter and 40 feet long. They are lined with corrosion-resisting alloy.

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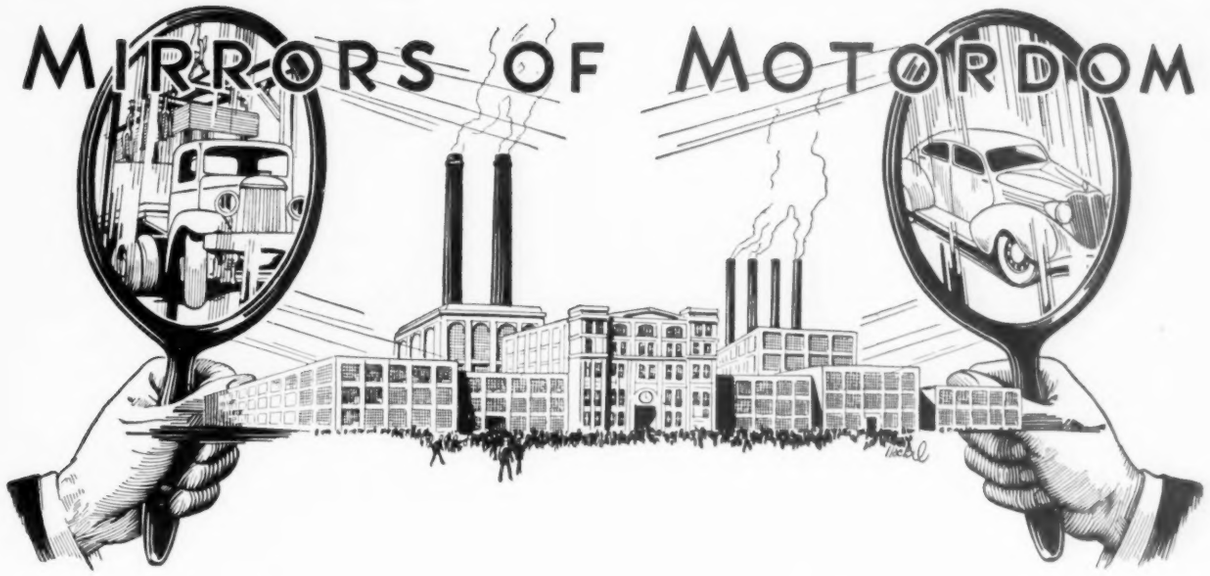
Ohio Forge & Machine Corp., 3010 Woodhill road, Cleveland, has been organized and has purchased the assets of Gears & Forgings Inc., in receivership since April, 1932. Officers are: Chairman, F. H. Chapin, president, National Acme Co.; president, S. C. Dalbey, formerly with the Ohio Forge Co.; vice president, J. M. Clem, also with the Ohio Forge Co.; executive vice president, H. B. Newell; secretary-treasurer, T. E. Leighton; and general sales manager, R. B. Tripp. The new corporation will operate the former Ohio Forge and Van Dorn Dutton divisions of Gears & Forgings.

Machine Tool Dealers Meet, Seek Code of Their Own

Associated Machine Tool Dealers, in annual convention at Chicago, Sept. 26-28, adopted a resolution asking for a code specifically covering their industry. They now are operating under the machine tool and equipment distributors' trade code and the machine tool and forging machinery industries code. It was the sense of the meeting that to avoid confusion the machine tool dealers should have a separate code applying to their own business.

Attending the convention were 55 dealers representing all sections of the United States.

Officers elected for the ensuing year were: President, W. F. McCarthy, Henry Prentiss & Co., New York; vice president, N. A. Booz, Federal Machinery Sales Co., Chicago; secretary, J. R. Van Dyck, Van Dyck Churchill Co., New York; and treasurer, Harry Barney, Barney Machinery Co., Pittsburgh.



DETROIT

AMONG the ranks of the independent motor car makers—barring Packard in this comparison—Hudson is probably at the most advanced stage of any in working out its 1935 model plans. For its Terraplane and Hudson lines proper, this maker has by now determined definitely on a course of coming changes.

Strictly complying with the rest of motordom, Hudson has no radical changes in prospect for its power plant, its transmission, or other basic mechanical features. Other than very slight departures—and none of them fundamental—the motor for next year will be practically unchanged. Of these few motor changes, the carburetor will have the most attention.

To retrogress slightly, ever since early this year the two radicals in design—Chrysler and LaSalle—came forth championing a differing school of design thought on how the ultra-advanced motor car would look, Hudson and all the rest of the 1934 conservatives have had a problem on their hands on whether to pattern and improve, and if so, with which one.

LEAN TOWARD GM STYLE

Though the Terraplanes and Hudsons are not casting their next year's votes with either in toto, the swing will be to LaSalle. The new Hudson radiator, narrower and decidedly more rectangularly-shaped than the present, is a tribute to this LaSalle change.

Hudson will draw in its overall length next year, adjusting it more closely to the present wheelbase. Flare-outs to the rear fenders, rather pronounced in the present series, are to be toned down and their curvature will follow the tire line more closely.

To accomplish this, Hudson will have to yield a point. For several months it has pioneered the "hidden fifth wheel" and has taken a staunch stand against fender wells or visible rear spares. The Hudson spare was set-in horizontally in the back panel, but next year, it will be placed in the same place, yet at a 45-degree angle down over the rear axle, sloping forward.

Because a fund of only some $50,000 has been appropriated for Hudson die changes, almost all the changes will be directed at modifying existing dies. The new back panel likely will be a revision, and prices were taken recently from die foundries for the entirely new radiator shell. Otherwise new die work will be negligible.

For the present, Hudson is working an unusual publicity stunt that, because of its novelty, deserves some mention. In order to combat whispered criticisms unfairly made against its bodies to the detriment of the powerful motor, Hudson decided to hit the ruggedness feature by scheduling actual performances on eighteen 1500-mile courses over the country.

Over each a Terraplane proceeds, and accurate tests will be compiled on performance. Each of the cars was requisitioned at random out of the ranks of present Hudson owners; none is a new factory car. The 18-ring circus got under way last week.

Hudson estimates this advertising scheme will cost a cool $250,000, but it will tell the story to the public of what the Hudson and Terraplane bodies will do under actual driving conditions. Each of these 18 courses is over a circular route through farm and city in every section of the United States. Few straightaways have been laid out, and every type of roadway will be experienced.

Meanwhile, at the Hudson plant, assemblies are continuing on a 3½ to 4-day week. About 200 cars daily, or between 700 to 800 a week, are coming off the lines. An encouraging reduction in dealers' stocks has continued, declines of about 350 cars weekly having been reported through the first two weeks of September. Incidentally, Hudson has just negotiated a $2,500,000 loan against liquidating inventories.

BUSINESS ALL BASEBALL

Speaking of the unusual in advertising, Ford captured a plum when it arranged to broadcast the coming World's Series baseball games. If ever a city has become feverish over the national sport, it has been Detroit the past few months.

Detroiters' conversation has shelved motor cars; now it is all baseball; Ford should garner valuable publicity from being first to capitalize on what Detroit is most keenly interested in, as Oct. 1 is at hand.

Just what General Motors plans to do with Pontiac and Olds next year looks to be an interesting game of tactics.

As is now generally known, Pontiac will come out in 1935 with a new 6-cylinder motor and in addition, will carry through on its present 84-horsepower straight eight series. Both of

Automobile Production

Passenger Cars and Trucks—U. S. Only
By Department of Commerce

	1932	1933	1934
January	119,344	130,087	156,907
February	117,418	106,888	231,707
March	118,959	118,002	331,263
April	148,326	180,713	354,745
May	184,295	218,347	331,641
June	183,106	253,387	308,051
July	109,143	229,357	266,575
August	90,325	232,855	234,809
September	84,150	191,800	155,000*

*Estimated.

Estimated by *Cram's Reports*

Week Ended	
Sept. 1	32,506
Sept. 8	38,166
Sept. 15	43,560
Sept. 22	38,329
Sept. 29	37,234

these new Pontiac lines bear a marked resemblance to what a present small LaSalle would look like and are being groomed from start to finish to thrust at the competition of such as Dodge, Nash and Studebaker.

This price class—just above the lowest tags, which are on Chevrolet, Ford and Plymouth—has been anyone's battleground for several years, and considering its size, General Motors probably has had a poor proportionate share in these honors, which especially in 1934 had been going to Dodge.

Also considering its size, many think General Motors has been unbalanced with but the one low-price car, Chevrolet, in depression times like the past three to four years.

For example, consider the "middle class field" covered by General Motors in Buick, Olds, Pontiac and some of LaSalle. Fully cognizant of this drift to lower price levels, General Motors is paving the way for Pontiac to fit into the family niche closely above Chevrolet.

In the meantime, Olds, which has had a sensational 1934 in making more than twice the number of cars it did in 1933, plans an equally ambitious 1935. To date, Olds has made 70,000 models this year and when 80,000 is reached, it will be the end of the run. General Motors has Olds down for another 100 per cent increase next year and expects 160,000 cars to be built and sold by this subsidiary.

NEW PONTIACS DELAYED

As the string runs out and the changeover month of October is at hand, Pontiac has closed its assembly lines. When they resume, production will be on 1935 cars, the interval of suspension being one of likely three weeks. Because of holdups last week, it became known that the new Pontiac will not be on the streets until Dec. 1. Presentation has been delayed a month from the expectation of just a few weeks ago.

On all of the General Motors cars it would not be surprising to see some form of a pointed windshield an early adoption. Engineers are talking it up as a wind-resistance feature compared to the rather large flat surface in windshields at present. If this pointed type shield, with a bead vertically down the center comes to pass, a new tonnage for bands, probably corrosion-resistant, will result.

What Detroit is talking about: Nash price reductions were to clear dealers' floors and thus forecast new models to be out some time in November . . . . Although Packard has completed considerable machine tool buying, it may yet salvage the greater part of 1100 old tools in the former aircraft division for use in producing the small car . . . . The transmission of the small Packard has been decided on as a plain bevel gear type . . . . Many of the parts for the Beacon model which Graham bought from Continental Motors are to be interchangeable with the present Graham series . . . . Willys-Overland may make a few slight changes in appearance in the next lot it produces . . . . Chevrolet has just completed assembling its 70,000th model in Japan since the assembly plant at Osaka has been in existence, from 1927 . . . . The cut in English horsepower tax, Jan. 1, 1935, has revived prospects of greater exports there for American automobile makers.

Died:

HOWARD K. MOORE, 50, special agent for the Wheeling Steel Corp., Wheeling, W. Va., vice president of the Wheeling Steel Corp. of

James P. Roe

Inventor of the Roe iron puddling process and for many years associated with the Reading Iron Co., Reading, Pa., whose death at Douglassville, Pa., was noted in STEEL, last week

Texas and the Wheeling Steel Corp. of Tennessee, at his home in Wheeling, Sept. 20, after a three months' illness. Mr. Moore's previous business experience had been with Lackawanna Steel Co., Buffalo, and later with the Portsmouth Steel Co., Portsmouth, O., followed by an association with the Whitaker-Glessner Co., Wheeling.

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Frank Wennels, 53, president of the Acme Tank Co., New York, in Morristown, Ont., Sept. 26.

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Charles Morton Parker, 66, former president of the American Radiator & Standard Sanitary Mfg. Co., in Los Angeles, Sept. 26.

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James O. Parker, 80, former president of the Heilman Machine Works, Evansville, Ind., in an Indianapolis sanitarium recently.

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William H. Maxwell, 64, manager of the Kalamazoo Steel Products Co., Kalamazoo, Mich., in that city recently.

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W. F. Smith, 53, vice president and chief consulting engineer of the B-W Construction Co., Chicago, in Washington, Sept. 22.

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Ludwig Vogelstein, 63, chairman of the board, American Metal Co. Ltd., and Jewish philanthropic and educational leader, in a New York hospital, Sept. 23.

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Samuel A. Stranahan, for nearly 18 years a member of the engineering staff of the Buick Motor Co., at his home in Flint, Mich., Sept. 6. He had charge of the chassis division of the company.

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Marvin W. Glasgow, 56, first hospital superintendent of the Tennessee Coal, Iron & Railroad Co., Fairfield, Ala., and for the past 20 years connected with the health department of that company, at his home in Birmingham, Ala., Sept. 20.

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Howard L. Rogers, 63, formerly a partner of Stone & Webster, New York, in Brookline, Mass., Sept. 20. Entering employ of Stone & Webster in 1893, he later had charge of many engineering and construction projects, and at his retirement in 1929 was vice president and director.

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Harry E. Henry, 45, in charge of the northeastern section of Ohio for Ex-Cell-O Aircraft & Tool Corp., Detroit, at his home in Cleveland, Sept. 20. He represented Ex-Cell-O for many years in the Cleveland district and in recent years also had represented Continental and Krueger-Wayne divisions of the corporation.

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Charles E. Sargent, 72, prominent in national engineering circles, in Indianapolis recently. In 1912 he was chief engineer of the Lyons-Atlas Co., engine builder, and later the Midwest Engineering Co. In 1907 he was awarded the Scott medal presented by Philadelphia for his complete expansion gas engine.

World Use of Tin Gains

World consumption of tin in the year ended June 30 totaled 128,000 tons, compared with 104,888 tons in the preceding year. Consumption of the United States was 55,934 tons, United Kingdom 20,451, Germany 11,128, France 9608, Russia 499, Italy 3900, and British India 1980.

Industrial Men in the Day's News

Donald G. Clark, New President, National Association of Purchasing Agents

Though educated in law, he has been active in purchasing work for 20 years with one company.

Prominent in civic life of Providence, R. I., he is a council member there and passes on city purchases.

He has contributed to the literature of industrial purchasing and is a leader in association work.

DONALD G. CLARK, recently elected president of the National Association of Purchasing Agents, in Cleveland, has been purchasing agent for the Brown & Sharpe Mfg. Co., machinery builder, Providence, R. I., since 1925. Prior to that time and since his start with the company in 1915, he was assistant purchasing agent and for a while associated with the sales department.

Born in Portland, Me., he attended Brown university, Providence, and was graduated in 1909. He then studied law at Harvard law school, being awarded the degree of LL.B. there in 1913. While at Harvard he was elected to Phi Beta Kappa, honorary scholastic fraternity.

With wide interest in civic affairs, Mr. Clark always has been active in organization work among purchasing agents. A member of the city council of Providence, he is chairman of the committee on purchases and passes on the placing of contracts by that city, the second largest in New England.

He is vice president of the Providence Y. M. C. A. and vice president of the Providence Lions club. In 1931-33 he was president of the Rhode Island Purchasing Agents' association. He is also a national director of the same association, being named for that regional post in 1933, an office he still holds.

As chairman of the educational committee of the National Association of Purchasing Agents since January, 1932, Mr. Clark was active in the sponsoring of the book *Industrial Purchasing* by Prof. H. T. Lewis of the Harvard graduate school of business administration, published in the summer of 1933. Mr. Clark also was a contributing editor to *Cost and Production Handbook*, published in 1933 by the Ronald Press, and has done considerable writing on subjects related to purchasing.

In addition to his other activities, Mr. Clark is also vice president of the National Association of Purchasing Agents for the New England district for the term 1933-34.

□ □ □

Thomas C. Potts has been elected president of Horace T. Potts Co., Philadelphia, iron and steel products, succeeding Harrison I. Potts, who has been president of the company since its reorganization in 1933. Thomas C. Potts has been associated with the company and its predecessor, Horace T. Potts & Co., since 1890.

□ □ □

Thomas Woods, assistant to the president of Carnegie Steel Co., has resigned effective Oct. 1. In the employ of Carnegie Steel and its predecessors for the past 53 years, he retires through the operation of the United States Steel Corp.'s retirement plan when employes reach 70 years of age.

Mr. Woods began his Carnegie career in 1881 with Carnegie Bros. & Co. Ltd. In 1900 he was appointed assistant general agent for Carnegie, Phipps & Co., and in 1924, special agent for Carnegie Steel Co. In January, 1927, he was appointed assistant to the president, and in October, 1930, director of the company. Since 1924 he has been in charge of the disposal of coke oven by-products, blast furnace products, and the purchase of scrap. He is a member of several Pittsburgh clubs and has been a member of the American Iron and Steel institute since 1912.

□ □ □

Phil H. Curtis has been elected secretary and treasurer of Jamison Steel Co., San Francisco and Los Angeles, distributor of alloy tool and die steel. His headquarters will be at 77 Natoma street, San Francisco.

□ □ □

John C. Bane Jr. has been elected secretary of Pittsburgh Forgings Co. Inc., Coraopolis, Pa. He is also director of the company.

John E. McKelvey has been elected a director of the company, succeeding C. E. Rafter, who has retired from the board but continues as treasurer.

□ □ □

Walter S. Doxsey, since 1926 editor of *Daily Metal Trade*, a Penton publication, has resigned effective Oct. 1, to become executive secretary of the American Steel Warehouse association, Philadelphia, which is expanding its activities and moving offices to 422 Terminal Tower, Cleveland. A

Walter S. Doxsey

graduate of Case School of Applied Science, Mr. Doxsey became affiliated with the Penton Publishing Co. following graduation and, with the exception of four years as sales manager of the former McMyler-Interstate Co., Bedford, O., has been active in publication work since that

time. He is well known in the iron and steel warehouse industry, as well as in the general iron and steel field.

□ □ □

Daniel Roblin, vice president of the Buffalo Housewrecking Co., Buffalo, and well known in the scrap trade, was honored at a testimonial dinner on his sixtieth birthday recently.

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Charles L. Hyland, for years in the sales organization of Empire Steel Corp. and Empire Sheet & Tin Plate Co., with offices in Dayton, O., has been named manager of sales for Empire Sheet & Tin Plate, with headquarters in Mansfield, O.

□ □ □

T. F. Rahilly, Algoma Steel Corp., Sault Ste. Marie, Ont., has been elected president of the Lake Cargo Coal Consumers' committee. This organization was formed recently to oppose increased freight rates on coal and comprises large industrial coal consumers of Michigan, Wisconsin, Minnesota and Illinois.

□ □ □

W. A. Nugent, for 20 years active in executive capacities with the Independent Pneumatic Tool Co., Chicago, and most recently sales manager, has been elected vice president in charge of sales.

Neil C. Hurley Jr., in charge of distribution of the company's electric tools, has been elected secretary.

□ □ □

Dr. Charles H. Herty Jr. has been appointed research engineer in the development and research department of Bethlehem Steel Co., Bethlehem, Pa. Well-known in steelmaking circles for his extensive studies and reports on open-hearth operation, Dr. Herty formerly was director of research for the Metallurgical Advisory board of Carnegie Institute of Technology, Pittsburgh. He graduated from the University of North Carolina in 1918 and in 1921 was awarded his doctor of science degree from Massachusetts Institute of Technology.

□ □ □

Robert W. Ballentine has been appointed district manager in Milwaukee for the Tyson Roller Bearing Corp., Massillon, O. For over 16 years he was active with the Timken Roller Bearing Co., Canton, O.

Hyman Ledeen, for a number of years a representative of the Falk Corp., has been named district manager in San Francisco and Los Angeles for the Tyson organization.

Ben L. Crew Jr., sales engineer, has been assigned to the Detroit office.

E. L. Farnsworth has been appointed service sales representative with offices in New York.

□ □ □

Samuel R. Hoover, veteran sales executive of Carnegie Steel Co., has retired from active business. Born in

Dr. Charles H. Herty Jr.

1877, he began his business career in 1898 with the Mahoning Valley Iron Co., Youngstown, O., where he worked in the mill, and later was in the general offices as an inspector. In 1899, he became a shipping clerk at the Lake Erie Works at Cleveland of Republic Iron & Steel Co., and in November, 1900, became affiliated with the American Steel Hoop Co. This concern in the following year became part of Carnegie Steel Co., and Mr. Hoover has been with the latter since that time. From 1918 to 1932 he was assistant to the general manager of sales, and in charge of bar and band sales.

□ □ □

D. M. Wilhelm, for the past four years sales manager of the Patterson Foundry & Machine Co., East Liverpool, O., has been elected secretary of the company. He joined the organization in 1927 as field engineer, becoming sales manager in 1930.

D. M. Wilhelm

E. M. Underwood, formerly division sales manager, succeeds Mr. Wilhelm as sales manager.

□ □ □

E. T. Weir, chairman of the board, National Steel Corp., Pittsburgh, has applied to the Bermuda government for permission to acquire a two-acre tract of land in the Mid-Ocean club colony near Tuckerstown, Bermuda. He plans to erect a home there, only recently having returned from an extended visit to this resort.

□ □ □

O. J. Huntley, precision boring demonstrator for Ex-Cell-O Aircraft & Tool Corp., Detroit, for several years, has been transferred to the sales staff and will be located in the Dayton, O., territory, handling the company's complete line of cutting tools, bushings, spindles, multiple and precision boring equipment.

□ □ □

American Society for Testing Materials announces election of officers of standing committees, the following being new officers:

H. W. Rother, metallurgist, Buffalo Foundry & Machine Co., Buffalo, vice chairman, and E. K. Smith, metallurgist, Electro Metallurgical Co., New York, secretary, committee A-3 on cast iron.

F. F. Farnsworth, Bell Telephone laboratories, New York, chairman, committee A-5 on corrosion of iron and steel.

Charles McKnight, International Nickel Co. Inc., New York, chairman; W. R. Shimer, metallurgical engineer, Bethlehem Steel Co. Inc., New York, vice chairman; J. J. Crowe, engineer in charge, apparatus research and development department, Air Reduction Sales Co., New York, secretary, committee A-9 on ferroalloys.

J. R. Townsend, general development laboratory, Bell Telephone Laboratories Inc., New York, chairman; W. H. Graves, chief metallurgist, Packard Motor Car Co., Detroit, vice chairman, committee B-6 on die cast metals and alloys.

Sam Tour, vice president, Lucius Pitkin Inc., New York, chairman, committee B-7 on light metals and alloys, cast and wrought.

Ships Equipment Abroad

George J. Meyer Mfg. Co., Cudahy, Wis., a suburb of Milwaukee, manufacturer of bottle-washing machinery, has shipped about 70 tons of production equipment to England for a branch plant being established in London to handle foreign business. The shipment was loaded into the S. S. LUKEFJELL at Milwaukee and will be trans-shipped to an ocean vessel at Montreal, Que.

1933 Value of Finished Steel Tops Billion, 18% Under 1931

CENSUS of manufactures report on steelworks and rolling mill products for 1933 places their value at $1,141,017,798, or 18.5 per cent less than the value of $1,399,488,877 of those products produced in 1931.

As shown in the accompanying table, wage payments declined 23.5 per cent from 1931 to 1933, while the value added by manufacture was off 20.9 per cent. Only the number of actual wage earners increased from 1931 to 1933.

Of finished products, sheets were the most valuable, what the census bureau calls "plain" sheets being valued at $102,608,473. The value of plates was $50,930,927, of steel bars approximately $106,000,000 structural shapes approximately $35,000,000, rails $15,000,000, direct steel castings $30,000,000.

Details of steelworks and rolling mill products follow (footnotes on page 73):

Class and Kind	1933 Tons (2240 lb.)	1933 Value
Steelworks and rolling mill products, aggregate value		*$1,141,017,798
Unrolled steel, total	23,159,749	
Open-hearth:		
Basic	20,033,695	
Acid	301,125	
Bessemer	2,428,585	
Electric or electrically refined and crucible	396,344	
Ingots:		
For sale	27,283	1,058,095
Interplant transfers	105,520	2,873,834
Produced and consumed in same wks.	22,751,138	
Direct steel castings:		
For sale	*208,172	*30,630,360
Interplant transfers	11,196	1,421,384
Produced and consumed in same wks.	*56,440	
Semifinished rolled products:		
For sale and for interplant transfer, total	5,470,287	$137,957,031
Blooms, billets and slabs, steel (except for forging)†		
For sale	1,485,563	40,269,687
Interplant transfers	1,539,326	39,229,254
Produced and consumed in same wks.	13,525,110	
Rolled blooms and billets for forging—		
For sale and for interplant transfer	64,138	2,008,338
Produced and consumed in same wks.	57,057	
Sheet and tin plate bars—		
For sale	1,677,654	40,284,633
Interplant transfers	691,632	15,741,738
Produced and consumed in same wks.	2,417,798	
Muck and scrap bar—		
For sale and for interplant transfer	11,974	423,381
Produced and consumed in same wks.	73,691	
Finished rolled produces and forgings, total‡	16,160,567	
For sale	9,947,844	447,985,367
Interplant transfers	1,218,382	47,558,768
Produced and consumed in same wks.	4,994,341	
Rails:		
For sale and for interplant transfer	393,144	15,157,302
Rail joints and fastenings, tieplates, etc., for sale and for interplant transfer	197,713	9,316,031
Structural shapes (not assembled or fabricated):		
Heavy (leg or web 3 in. and over), for sale and for interplant transfer	767,605	27,000,722
Light (leg or web less than 3 in.), for sale and for interplant transfer	224,167	8,215,356
Heavy and light, produced and consmd. in same works	68,178	
Concrete reinforcing bars, for sale and for interplant transfer	357,053	12,308,788
Steel bars (merchant, etc.):		
Open-hearth or bessemer—		
For sale	2,063,602	84,774,089
Interplt. transfers	154,402	6,888,740
Electric and crucible steel bars, for sale and for interplant transfer	57,469	16,176,741
Produced and consumed in same wks. (open-hearth, bessemer, electric steel and crucible steel bars)	163,273	
Iron bars (merchant, etc.):		
For sale	44,695	3,321,630
Interplant transfers	552	26,750
Produced and consumed in same wks.	1,724	
Wire rods:		
For sale	441,793	15,396,200
Interplant transfers	293,736	10,783,139
Produced and consumed in same wks.	1,297,499	
Bolt and nut rods; spike and chain rods:		
For sale and for interplant transfer	33,969	1,360,886
Produced and consumed in same wks.	117,227	
Plates (No. 12 and thicker), not coated:		
Boiler and other plate, n. e. s.—		
For sale and for interplant trans.	1,396,514	50,930,927
Produced and consumed, same wks.	56,318	
Crucible and electric plate and saw plates, for sale and interplant trans.	7,414	1,528,713
Stainless steel, for sale and interplant transfer	2,146	1,048,482
Sheets (No. 13 and thinner), not coated:		
Automobile body, for sale and interplant transfer	400,141	22,264,827
Black for tinning (tin mill black plate)—		
For sale and interplant transfer	122,748	7,082,148
Produced and consumed, same wks.	1,666,265	
Plain—		
For sale and interplant transfer	2,154,557	102,608,473
Produced and consumed, same wks.	674,449	
Stainless steel, for sale and for interplant transfer	8,231	4,963,184
Skelp:		
For sale	275,329	8,938,355
Interplant transfers	192,232	6,267,654
Produced and consumed, same wks.	549,352	
Cotton ties, for sale	45,733	1,487,954
Hot-rolled strips and flats for cold rolling less than 24 in. wide)		
For sale and for interplant transfer	454,593	18,040,737
Produced and consumed, same wks.	270,080	
Other strips and hoops and bands—		
For sale and for in-		

(Please turn to Page 73)

Steelworks and Rolling Mill Data for 1933 and 1931

	1933	1931	Per cent of increase or decrease
Number of establishments	393	446	—11.9
Wage earners (average for the year)[1]	276,925	264,634	+ 4.6
Wages[2]	$258,731,805	$338,386,533	—23.5
Cost of materials, fuel and purchased electric energy[2]	$691,982,165	$831,883,987	—16.8
Products, total value[3]	$1,143,644,975	$1,402,843,188	—18.5
Steelworks and rolling mill products	$1,141,017,798	$1,399,488,877	—18.5
Other products, value and receipts for custom and repair work	$2,627,177	$3,354,311	—21.7
Value added by manufacture[3]	$451,662,810	$570,959,291	—20.9

[1]Salaried officers and employes not included. [2]Manufacturers' profits or losses cannot be calculated from the census figures because no data are collected for certain expense items, such as interest, rent, depreciation, taxes, insurance, and advertising. [3]Value of products less cost of materials, fuel and purchased electric energy.

EDITORIAL

A Real Achievement in Research and Development!

TO THE leaders of industrial groups who believe that changing conditions threaten to seriously curtail or eventually wipe out their business, we strongly recommend a careful study of what the executives of street railway companies are doing to improve the condition of their properties and services.

Everybody knows that the rise of the automobile has played havoc with the volume of traffic on electric traction lines. Thousands of miles of interurban tracks have been torn up. In most of the smaller cities, the local street car lines battled hard to hold their business against the new competition, but their efforts were in vain. Only in the larger communities have the electric lines been able to avoid bankruptcy, and even in these favored centers, the management frequently has been confronted with a steady decline in business.

Electric traction operators have tried numerous schemes to stem this loss of patronage. Many companies have added auxiliary bus lines. Weekly passes and other inducements to the public to use street cars more freely have been introduced. These and other methods have helped, but they have fallen short of what is needed to re-establish the industry upon the desired basis of stability. The main problem of making a trolley ride attractive to the public still was not solved.

Traction Companies Adopted Program To Improve Design and Construction of Cars

To meet this situation the electric railway presidents' conference committee inaugurated an extensive program of research and development with the objective of improving electric transportation equipment. This work has been going on quietly for some time. Last week the results were shown in the exposition held in Cleveland in connection with the fifty-third annual convention of the American Transit association. Several new noiseless street cars, representing the combined efforts of the committee and of co-operating manufacturers, were demonstrated publicly for the first time.

These cars, designed by Dr. C. F. Hirshfeld of Detroit, are radically different from ordinary street railway equipment. They are 20 to 25 per cent lighter in weight, the rate of acceleration is higher, braking power is greater and more smoothly applied, operation is practically noiseless compared with that of cars of orthodox construction, and in matters of ventilation, lighting, seating, etc., the cars set new standards for riding comfort (see p. 29).

Two aspects of the development of these supercars are worthy of the careful study of the executives of companies engaged in the production and fabrication of materials and in manufacturing in the metalworking industries.

Group Action Distributed Financial Burden and Freed Designers from Clutches of Tradition

First is the fact that the Hirshfeld cars present a striking testimonial to the efficacy of group research and development. It is extremely doubtful whether any single traction system, or any individual car builder, working independently could have matched the collective achievement of the presidents' committee and the co-operating manufacturers. In this case the group idea not only helped to distribute the financial burden but it also divorced research and development from individual and company prejudices, thus freeing the designer and his staff from many of the restrictions of custom and tradition.

Secondly, the achievement again emphasizes the community of interest which should bind the efforts of the operators and builders of equipment with those of the companies which furnish materials, parts and services. The Hirshfeld cars reflect a high degree of co-operation on the part of producers of materials and parts makers. Without that co-operation the reduction in weight would not have been possible, nor would the minimizing of noise, greater flexibility in operation or increased riding comfort have been feasible.

In itself the electric street railway field is not a major consumer of steel and other metals or of metal parts. Probably it is outranked by a score of other consuming groups. Nevertheless the action it has taken, through the excellent work of its presidents' conference committee, is indicative of similar steps which must be taken, sooner or later, by most of the important consuming industries.

In the next decade research and development of this kind will be witnessed in connection with ships, locomotives, railroad cars, factory buildings, cranes, heavy machinery of all kinds, etc. Alert producers of materials and manufacturers of parts will be in on the ground floor in these developments. If they do this as effectively as the producers and manufacturers co-operated in the case of the Hirshfeld cars, new market possibilities for metals and metal products will be assured.

THE BUSINESS TREND

Trend Is Reversed; Signs of Improvement Appear

BUSINESS sentiment has improved noticeably in the past 10 days. This is due in part to a slight increase in industrial activity, to better conditions in retail trade, and in no small part to evidence which seems to show that President Roosevelt at last realizes the extent to which some of his policies were retarding recovery and is taking steps to correct them.

The tangible signs of business improvement are more numerous. Recent gains in the rate of steelmaking are more positive. A steady, gradual upward trend seems to be in progress. The volume of revenue railroad freight traffic again is at encouraging levels. The total of 645,986 cars for the week ending Sept. 15 was the highest yet recorded in 1934. Preliminary figures indicate that another good total will be announced for the week which closed Sept. 22. Electric power output for the week ending Sept. 22 showed a small loss from the preceding week, but the decline was less than in several preceding reports. The next power figures issued by the Edison Electric institute may give a hint as to how much the decline in power output in the first three weeks of September was due to the textile strike.

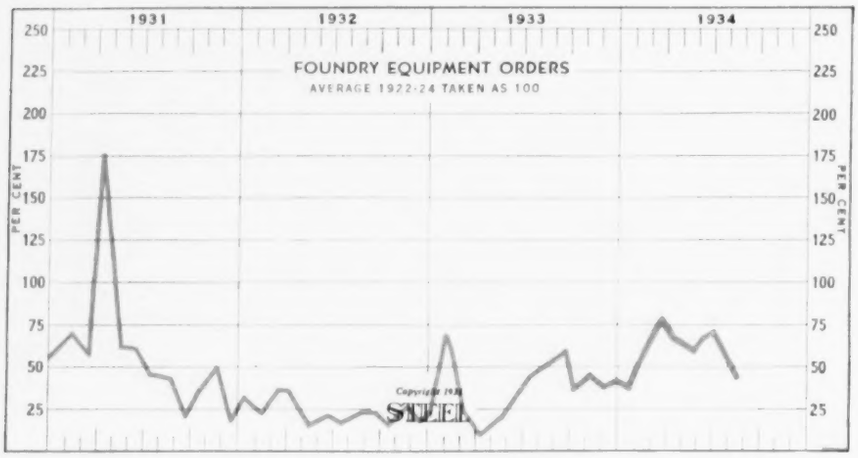
Administration Is Moving Quietly To Undo Damage Wrought by Its Past Mistakes

Chief among the intangible factors contributing to improved sentiment was the settling of the textile strike a week ago and the more definite indications that the government administration is willing to listen to reason. Secretary Roper's address at Cincinnati was more openly conciliatory to business than his previous utterances of reassurance. Mention of the names of Baruch, and Swope in connection with the revamping of NRA is comforting to industry. Indications that the administration learned a lession from its recent monetary scare also is considered a favorable factor.

Apparently the administration is being forced by the sheer weight of circumstances to swing to the right. It is attempting to do it quietly and, if possible, imperceptibly, in order to save face.

1934	
Aug.	244,713
July	277,690
June	321,976
May	351,813

1933	
Aug.	242,566
July	239,628
June	260,645
May	227,699



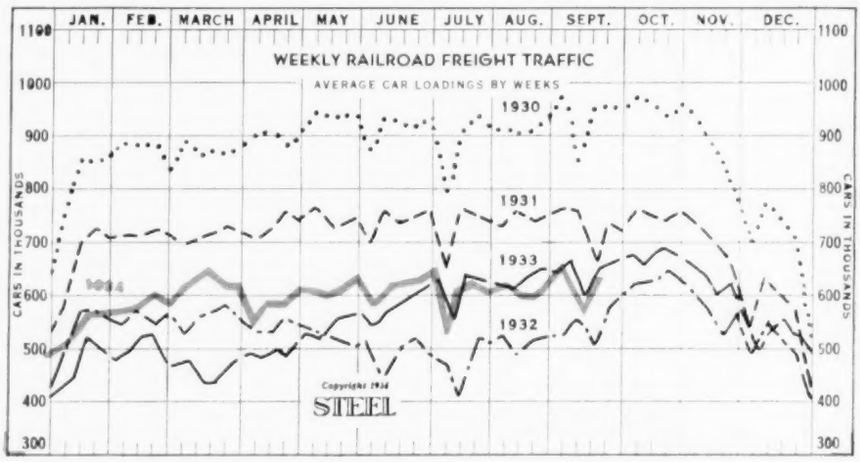
Foundry Equipment Orders Decline Sharply

Foundry equipment orders declined during August, according to the monthly report of the Foundry Equipment Manufacturers association. The index of gross orders was 43.1. This compares with 50.7 in July and with 56.3 in August a year ago. The August index was the lowest for any month since last January when it stood at 37.2. During the past 13 years the orders index in August has registered nine gains and declined four.

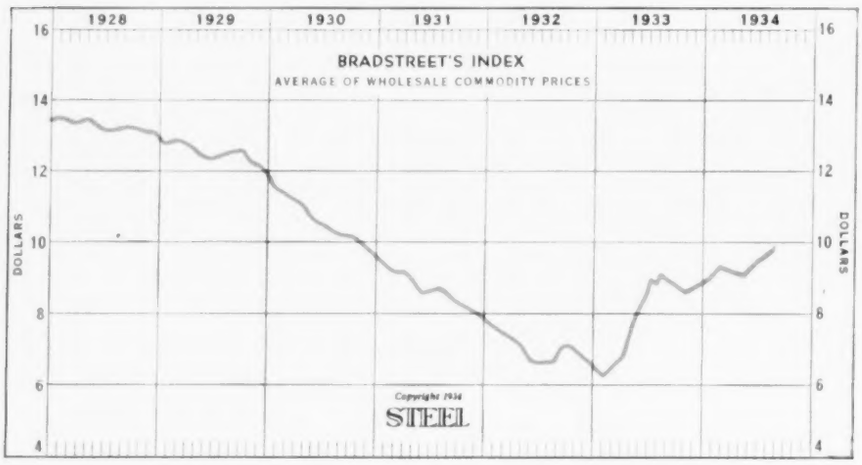
	Per Cent
August, 1934	43.1
July, 1934	50.7
August, 1933	56.3

Freight Traffic Gains; Below 1933 Level

Loadings of revenue freight in the week ending Sept. 15 totaled 645,986 cars, according to the weekly report of the American Railway association. This is a gain of 83,256 cars compared with loadings in the previous week, but a decrease of 14,100 cars compared with the movement in the corresponding week of last year. Increases were registered for all classifications of freight with the exception of miscellaneous freight, grain products and livestock decreases were shown throughout the list as compared with the preceding year.



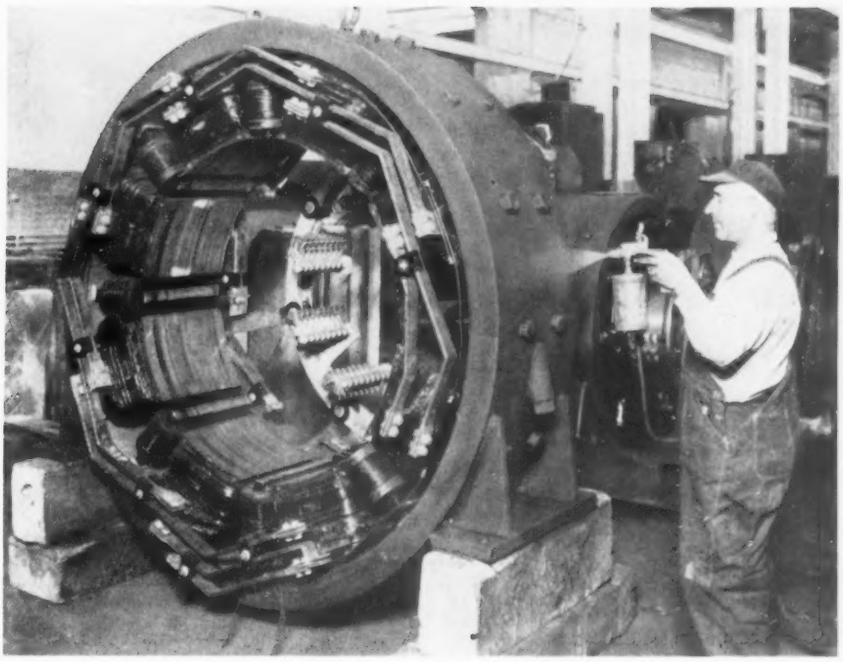
	1934	1933
Sept. 15	645,986	660,086
Sept. 8	562,730	577,933
Sept. 1	645,780	666,652



Sept. 1	$9.47	$8.99
August 1	9.32	9.00
July 1	9.23	8.33

Commodity Prices Continue Upward Movement

Marking the third successive monthly advance since the upward swing began in June, the Dun & Bradstreet index of wholesale commodity prices rose to $9.47 on Sept. 1, or a gain of 1.7 per cent. This latest advance brings the current index to the highest level in over three and a half years, with the total rise in the commodity price level since March 1, 1933, amounting to almost 50 per cent. The Sept. 1 index number compares with $8.99 during the same period last year, or an increase of 5.4 per cent.



QUICK - DRYING lacquers, sprayed on, not only provide protection to surfaces of industrial machinery such as this large stator frame, but add greatly to appearance. Photo courtesy General Electric Co., Schenectady, N. Y.

APPEARANCE—IN DESIGN AND COLOR—HELPS SELL FABRICATED PRODUCTS

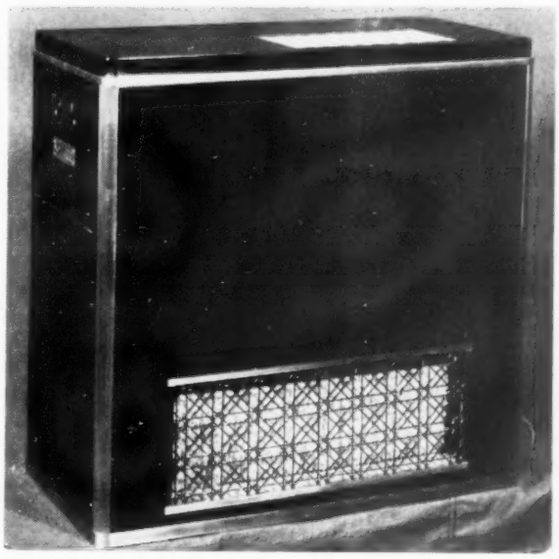
MANY manufacturers of fabricated metal products are increasing their volume of business by giving special care to appearance and finish of their goods. They have redesigned their products in many cases, changing their appearance for the better. Many of them have made such improvements by the use of paint, lacquer, chromium plating, cadmium plating, porcelain enameling, rustproofing and other operations, in conjunction with a greater degree of buffing and polishing. In many cases appearance has been improved by the use of die castings as parts.

These improvements now are being incorporated to an increasing extent in such manufactured products as machine tools, machinery and other structures, mill supplies, hand tools, kitchenware, cutlery, electric refrigerators, washing machines, waste baskets, vacuum cleaners, building trim, and a wide range of household and office accessories.

A good many buyers consciously or unconsciously associate good appearance with quality.

"Other things being equal," says one buyer of machinery, "I usually buy the machine that looks the best. Nine times out of ten, when the outside is good the inside is bound to be equally good. Too, our employes give more care to a machine that looks good. That alone means better performance and a longer effective life for that machine."

Recently numerous manufacturers who always previously had thought themselves perfectly capable of designing their own products, have called upon professional artists to aid them in a consulting capacity. A case by way of illustration is that of a manufacturer of testing machines. In days not so far back, the factor of appearance was not considered in designing testing machines, and many



Air cooling unit of steel decorated with dull black porcelain enamel and polished stainless steel trim, designed to harmonize with any furnishings or decorations. Photo by York Ice Machinery Corp., York, Pa.

old testing machines fittingly might be displayed in an industrial chamber of horrors.

This company created a board of design, comprised of the sales manager, the production manager, an outside commercial artist and the president of the company. As a result, the testing machines now made by this company conform to a standard design in which pleasing lines are combined with utility.

While machine tool builders continue to have primarily in mind the fact that their tools must be sold on the basis of performance, many of them have improved the appearance of their machines. Some of them have achieved graceful lines. Others have improved appearance by adding metal to certain sections for the purpose of more completely absorbing vibration resulting from higher speeds which are prevalent nowadays, owing to the development of high-speed cutting tools. In such cases striking appearance often results from the well-known principle that when a structure is designed correctly to do the work for which it is intended it is certain to look well.

Smoother Outer Lines

Appearance also has been improved in a good many cases by the use of so-called "streamline" design methods. A motor may be mounted in the base of a machine instead of outside. A control panel, instead of being placed on a machine, for instance, may be built into a column, with a cover that is flush with the face of the column. Or, appearance may be improved in certain cases by the use of welded, or part-welded, construction.

Aside from the improvement of design features, a tendency is being displayed to brighten the appearance of machine tools by the use of color. There is a tendency to get away from the use of the conventional machine tool gray. To some extent machine tool manufacturers are taking the initiative in this trend, but most of the impetus is being furnished by buyers. A planer, as a result of the buyer's request, just has been shipped with a coat of yellow. One machine tool manufacturer now paints his entire line a greenish gray. A manufacturer of portable drilling units is using an orange finish. A manufacturer is painting milling machine bodies in bright red. This tendency is expected to become more pronounced inasmuch as buyers are developing certain preferences. Under certain lighting conditions, for instance, one large user of machine tools believes tools painted orange reduce eye-strain. Some users say that their experience indicates that the use of light colors as machine tool finishes increase production. Mechanics like their machines better, keep them wiped clean and get more work out of them.

Cadmium-plated emergency chain, combining rust resistance with pleasing appearance. Photo courtesy Cleveland Chain & Mfg. Co., Cleveland

Chromium plating is not generally applied to parts of machine tools for improving appearance; nevertheless its use has that effect. For instance, one machine tool manufacturer installs chromium-plated dials. The purpose is to keep the dials bright in order that they may be read easily.

A used machinery dealer reports an increase in his sales as a result of giving more attention to appearance of rebuilt machinery. This dealer builds up worn wearing surfaces or replaces worn parts. He uses a chemical spray to remove oil and old surface paint, and cleans the grease out of the interior, such as the gear boxes. He then renovizes and paints the exterior of the machine, the inside of the gear box, etc. After operating along these lines for the past year and a half, this dealer is convinced that a return to the old policy of disregard for appearance would mean a big drop in his present volume.

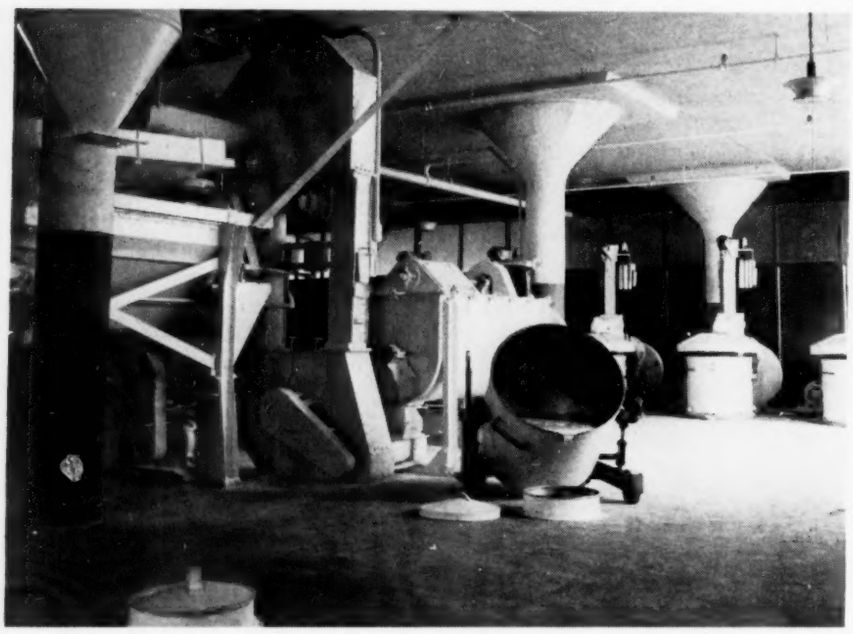
Rusting Is Prevented

Some time ago a file manufacturer increased his sales by lacquering all files that were to go into dealers' or retailers' stocks. The lacquered coating effectually keeps the files bright and rust-free, and without reducing the efficiency of the files, since the lacquer immediately peels off when the file is placed in service.

A gear manufacturer now is doing some invstigational work with a view to putting a rust-resisting surface or a protective coating on his finished product. This manufacturer has received several complaints from jobbers. After the gears had been on the jobbers' shelves for a certain length of time, they started to rust. While this did not seriously affect the mechanical efficiency of the gears, it rendered them less salable. Here is a case where lack of attention to surface threatens to reduce the manufacturer's volume of business.

Many hand tools and accessory tools now are being given a protective coating or plating of some kind. Or they are being given a touch of paint which serves as an identification mark. A saw manufacturer is getting good results by painting color streaks on high-speed saws, and by painting the ends of ordinary hacksaws. Another covers high-speed saws with aluminum paint. A manufacturer of machine knives recently adopted the practice of painting all but the cutting portion of each knife, thus enhancing the appearance of the product as well as providing a protective coating.

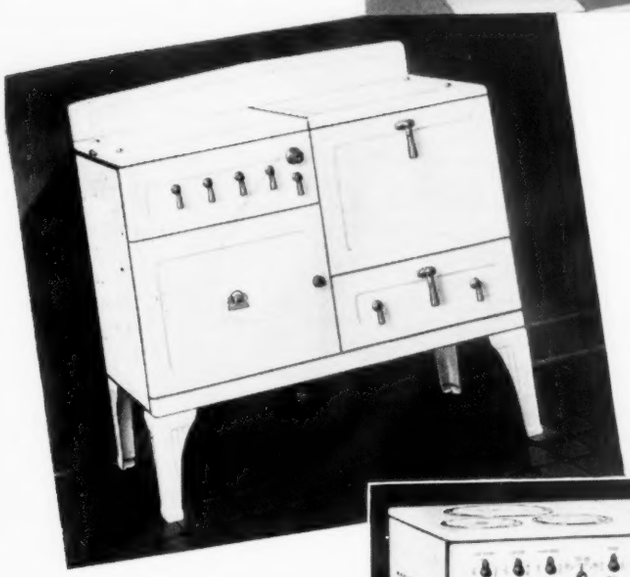
Special machinery reflects greater use of color. Two large shoe manu-

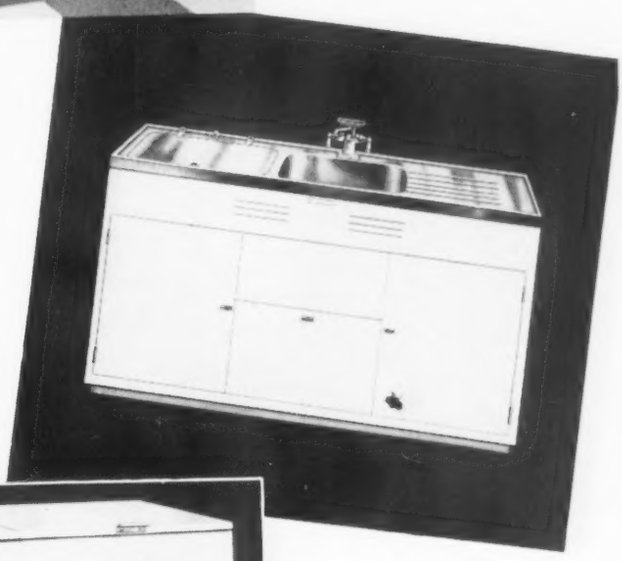


In a plant manufacturing a well-known antiseptic, all equipment is painted white to stress the cleanliness factor

A NEW de luxe, flat-top, automatic, electric range (right), designed by Ray Patten, well-known industrial stylist. It is made in porcelain enamel white finish, with monel metal top and base. Cadmium plating used in warming compartments, utility storage drawer and other interior parts. Top four photos on this page courtesy General Electric Co., specialty appliance sales department, Cleveland

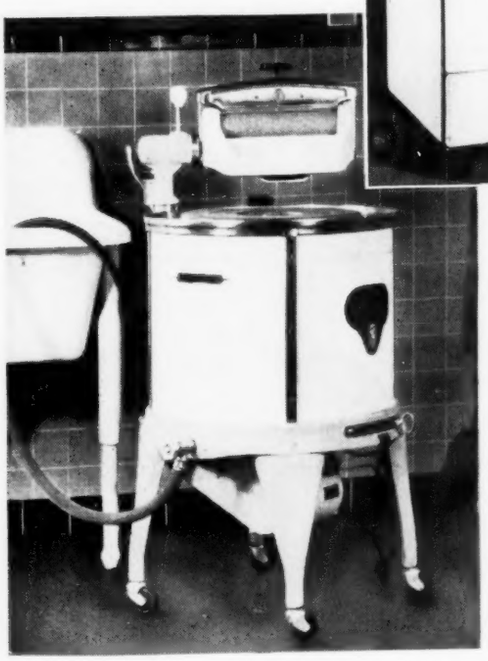
NEW "companion" electric range and refrigerator set (center below) is of pleasing appearance, even though the units were stripped of all non-essentials to keep down the cost, which is $142.50. The finish is either porcelain enamel or baked glyptal enamel. Outside treatment is white with black legs and trim. Inside treatment white, blue and pebbled blue



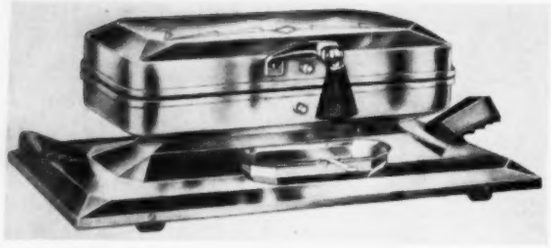


A newly designed gas range (above) with table top and finished with porcelain enamel in ivory with black trim

De luxe kitchen sink (above) with dish washing compartment, of porcelain enameled steel with top and base of monel metal



IN these washing machines, appearance and utility are combined in porcelain-enameled and lacquer-sprayed steel construction. On higher priced machines, such as illustrated at the right, appearance is enhanced by the use of nickel, chromium and cadmium-plated steel, and zinc and aluminum die castings. Photos courtesy Apex Rotarex Corp., Cleveland



SANDWICH toaster, with particular attention to the factor of appearance. It is made of steel, with chromium plate finish. Photo courtesy Dominion Electrical Mfg. Co., Minneapolis

facturing plants use different color groupings in different divisions and with great success; for one thing, since the use of colors came into being in these plants, the amount of rejected products and damaged materials has been reduced materially. At a radio tube plant some of the machinery is painted in orange and pastel blue, to contrast with other machinery finished in green or blue, and at this plant also the introduction of color in this way has been followed by a reduction in the number of defective tubes.

Householders Look to Appearance

It is in the field of household equipment and goods that most attention is being paid to the matter of surface appearance and design. Department store buyers report that appearance is a big factor in appealing to the pocketbook of the average householder. For instance, an electric refrigerator which looks good automatically sells in greater volume than one that may be just as good from a service standpoint, but is less pleasing to the eye. Hence, manufacturers doing the best job from an appearance standpoint can count on less resistance on the part of distributor-buyers.

A tour of a department store with a buyer or merchandise man reveals much as to what the public now is buying, and suggests what the manufacturer has to do to get his share of the business.

For instance, the leading makes of electric refrigerators are finished in white porcelain enamel, with rust-resisting metals used for the fittings. Aside from refrigerators, kitchenware shows a marked color trend. Among the prevailing colors most popular in kitchenware at the moment, are ivory with red or green trim. The color trend is reflected to some extent in electric washers which are finished in porcelain enamel in white, gray, green and other colors. The new electric cooking ranges, as well as some of the newer gas ranges are finished to some extent in color porcelain enamel.

Porcelain enamel also is used to an increasing extent on hot water boilers, radiator covers, water coolers and air conditioning and cooling units. It is in water coolers and air cooling units that a particularly wide variety of finish is encountered, colors and wood graining being set off in many instances by stainless steel or chromium-plated trim. One line of vacuum cleaners has been improved with a coating of "silver sheen," obtained by a mixture of aluminum and green paint.

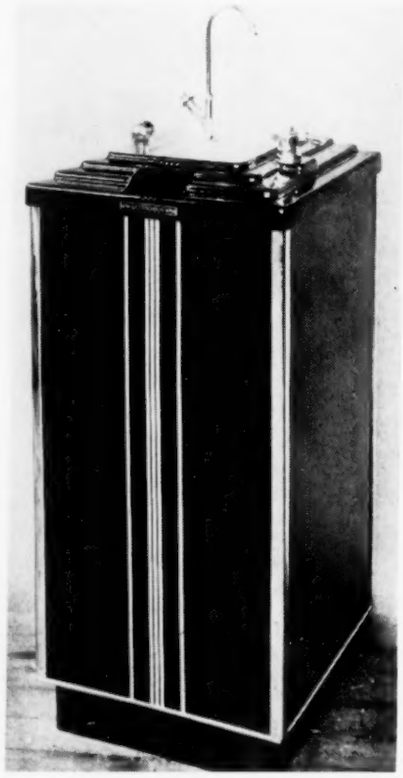
A manufacturer of domestic gas heating units made out of sheet steel has had successful results by giving them an exterior "crinkle" finish. This is obtained by applying japan when the surface is in the horizontal position; when elevated to the vertical, the japan crinkles and sags and it sets in this form when baked in an oven. Manufacturers of radio sets and many other products obtain a highly attractive and satisfactory finish in crystal japan, which is easy to apply and costs little.

Here are some changes in surface treatment which were noted in one large retail store. Steel or cast iron frying skillets, formerly black, now are being chromium plated. Sandwich toasters, stamped from steel sheets and formerly nickel plated, now are chromium plated. Chromium plating now is used extensively on pot covers of various kinds; these formerly were of plain tin plate or enameled steel sheet. Stamped steel grilles, formerly made from plain tin plate, now are being chromium plated.

More stainless steel is being sold by the retail stores, mainly in the form of kitchen utensils and cutlery. The price of stainless steel goods is reported by store buyers to be holding back distribution of such goods from the volume it otherwise would enjoy. Stainless steel and monel metal sinks and dish washers are reported meeting improved demand.

Cadmium-plated metal products are showing some gain in the retail stores. A new product, for instance, is a portable clothes-drying rack. This is made of steel wire, cadmium plated for appearance and resistance to the effects of moisture; in other words, to keep rust spots out of the clothes. Curtain stretchers made of $\frac{3}{8}$ and $\frac{5}{8}$-inch steel rounds, formerly enameled, now are being cadmium plated.

In steel assemblies for industrial use, cadmium plating continues to be more widely adopted for the purpose of combining appearance with corrosion resistance. An Ohio plant cadmium plates thousands of voting machine parts. A large automobile manufacturer cadmium plates hundreds of parts, such as brake parts, electrical connections, carburetor and gas gage parts, door locks and handle details, front seat mechanism and other parts. These are but two examples of the wide field of application of this coating in industry.



Sides of cabinet of this steel water cooler are of black micarta inlaid with natural anodized aluminum. Top is porcelain-enameled in black and basin is covered with white enamel. Spouts and faucets are chromium-plated. Photo courtesy Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Develops Alloy Material for Metal-to-Glass Seal

A new metal-to-glass seal has been developed by the research laboratory of the General Electric Co., Schenectady, N. Y., which, because of the certainty with which tight and reliable joints can be made between glass and the new alloy known as Fernico, has opened up many possibilities in the development of various classes of vacuum tubes and other devices wherein leading-in wires or conducting parts must pass through gas-tight insulating seals or themselves form part of a gas-tight chamber.

The new material can be machined, forged, punched, drawn, stamped, soldered, copper-brazed and welded with a facility equal to that with which these operations can be performed on a high-grade nickel iron.

The physical characteristic of the alloy which makes possible its successful fusion with glass is its expansion curve, which coincides almost exactly with that of certain glasses. For this reason, no stresses are set up in either the glass or the alloy when cooling from the fusion temperature.

To Compare Merits of Three New Street Car Designs

BY W. G. GUDE
Associate Editor, STEEL

EVIDENCE of the progress that has been made the past several years in the design of electric railway equipment is demonstrated in three new street cars placed in experimental operation by the Chicago Surface Lines this year. Interesting to the metals industry is the fact that while each car represents a marked development in the attainment of quietness, comfort, safety, smoothness and economy of operation, different materials were used in their construction. One is built largely of carbon-vanadium steel, another of a special alloy steel and the third of aluminum. From the experience gained with this equipment in the actual transportation of passengers, the designers expect to be able to evaluate the advantages and disadvantages of the different designs and materials.

Special Designs Evolved

Two of these cars, built by the Pullman Car & Mfg. Corp., Chicago, were turned over to the Surface Lines recently while the other, built by the J. G. Brill Co., Philadelphia, was delivered last March. One of the Pullman cars is built principally of aluminum and is the design of that company; the other, involving the use of USS (United States Steel Corp.) Cor-Ten low-alloy steel in its construction, follows specifications prepared by the Electric Railway Presidents' Conference committee of the American Transit association, of which Dr. C. F. Hirshfeld, Detroit, is the chief engineer. The Brill company steel car also embodies design principles developed by the Conference committee.

This committee, composed of electric railway executives and heads of equipment manufacturing companies, raised a fund of $500,000 and, in 1930, engaged Dr. Hirshfeld to conduct experiments to determine how to improve street car construction. These cars speak for the results attained by this group. The steel and aluminum units are the property of the Chicago Surface Lines, while the alloy steel car, built for the Conference committee, is to be taken to different cities for trial runs under varying operating conditions. These three cars were exhibited at the equipment show held in conjunction with the meeting of the American Transit association in Cleveland last week (see p. 31). Thousands of visitors inspected the new cars.

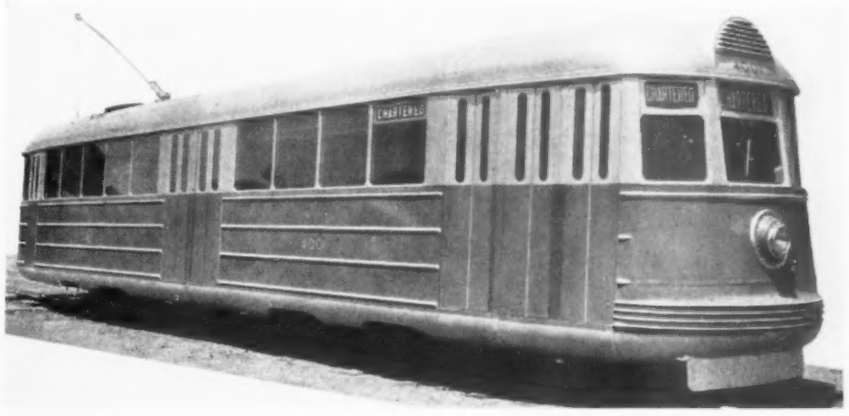
For easy comparison, figures for weight, seating capacity and approximate overall length are listed below for the three cars:

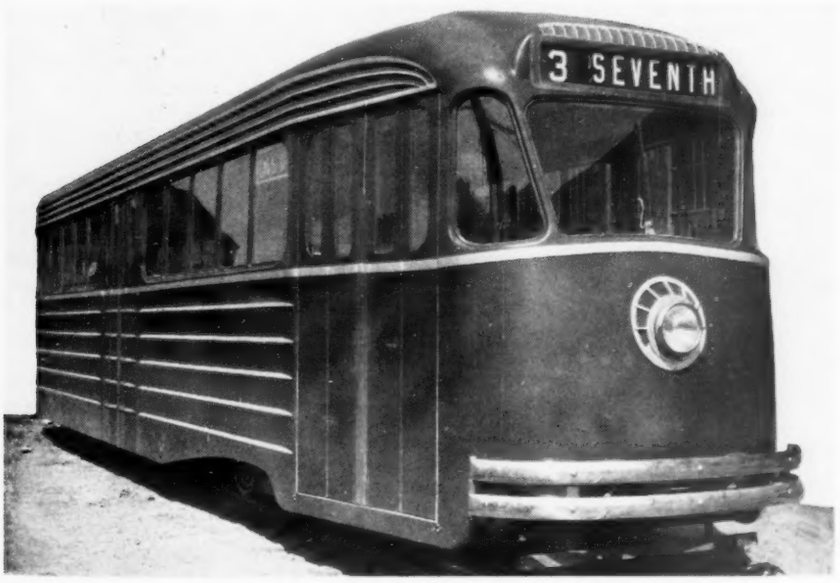
	Weight, pounds	Capacity	Length, feet
Cor-Ten steel	31,400	47	45
Aluminum	29,600	58	50
Vanadium steel	37,340	58	50

These weights compare with 40,000 to over 50,000 pounds for older types of equipment. Most cars used in Chicago today weigh about 50,000 pounds.

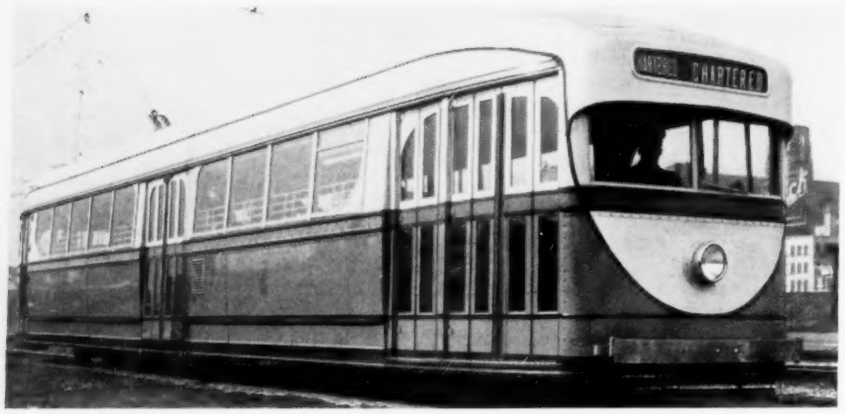
The Pullman-built, alloy steel car is designed for one-man operation, with entrance doors at front and exit doors at center. While the weight of this unit is about 31,000 pounds, studies made since its construction indicate that the figure can be reduced by about 2000 pounds in future design, according to Dr. Hirshfeld. Doors of the car are made of Met-L-Wood.

Automotive influence is reflected in





EXPERIMENTAL street car (left) built of USS Cor-Ten steel, weighing 31,400 pounds and seating 47. Older types of cars average about 50,000 pounds in weight. This car was demonstrated at the meeting and exhibition of the American Transit association in Cleveland last week. Aluminum trucks and superstructure are used in the car shown above, which weighs 29,600 pounds and seats 58. Acceleration to 40 miles per hour in less than 10 seconds is possible



Similar to the aluminum car but weighing about 8000 pounds more, this car is built principally of steel and features quietness in operation, freedom from vibration, rapid acceleration and deceleration, and improved heating, ventilating and lighting

the type of bumpers, in the streamlined design of the body and in the use of shatterproof glass for all windows. Heating is obtained from electric strip type heaters placed underneath the car as well as from heat generated by control and brake resistors. Warm air is distributed by blower fans through ducts on the floor at the sides of the car, with ducts below the headlining carrying fresh and recirculated air.

Structural members of the car are USS Cor-Ten steel, with laminated wood used for the floor, roof and headlinings. Cor-Ten is a chromium-silicon-copper alloy steel, low in carbon and high in phosphorus, with high tensile properties and corrosion resistance of about four to six times that of ordinary open-hearth steel. Its tensile properties permit a reduction in weight without a decrease in strength compared with ordinary steel. Cor-Ten is manufactured by various subsidiaries of the United States Steel Corp.

Assembled by Welding

All the frame members of this car were welded together instead of being riveted as in the former practice, and the covering sheets, such as roof, sides and ends, are welded to the frame. The result is a body the parts of which are so well integrated that the structure acts substantially as a single unit instead of more or less as a rather loose assemblage of parts.

Four 50-horsepower motors provide rapid acceleration up to 50 miles an hour, while the brake system is the General Electric Co.'s eddy current type arranged to operate in conjunction with magnetic track shoe and hydraulic brakes. Four-wheel trucks have 24-inch diameter wheels and employ rubber cushioning instead of the conventional coil and leaf springs. Structure of the truck was fabricated from tubular sections welded integrally.

Quietness of operation is one of the principal characteristics of this car, as well as of the other two, and results largely from studies made by the Conference committee of wheel and truck design. The outcome of these studies was the development of a wheel made of steel parts so interlocked with rubber as to give the required degree of resilience combined with the necessary strength. This design substantially absorbs noise and vibration resulting from contact between the wheel and rail, while rubber mounting in the trucks acts as a further bar to the transmission of noise and shock to the body. The net result is a quietness of operation comparable with that of the ordinary automobile.

Details of Aluminum Car

The car designed by the Pullman corporation is larger than the alloy steel unit but weighs slightly less. It was built principally of aluminum alloys and where possible extruded shapes of interlocking sections were used for the main members. Rivets are steel. Interior finish is of sheet aluminum including the headlining which is of special arched shape that meets in the center of the car with a duct used for recirculation of air.

The four-wheel, all aluminum trucks are equipped with four 60-horsepower motors and are insulated with rubber to reduce noise. Acceleration to 40 miles an hour in less than 10 seconds is possible. Brakes are a combination of air, dynamic and magnetic track shoe types.

The duct located along the center line of the roof and running the length of the car serves to remove foul and overheated air from the car by means of an exhaust fan located at one end. During winter months fresh air is drawn in at one end near the roof and blown over electric heaters grouped at the end at either side. The heated air is carried by ducts along the floor line and discharged into the car to provide uniform heat. When heat is not required, the forced draft and distribution system is used to provide an increased quantity of fresh air for ventilating purposes. Indirect lighting, leather upholstered seats, shatterproof glass and insulation on the sides, roof and floor to deaden outside noises are other conveniences provided passengers.

The first of the new cars, built by the J. G. Brill Co., is similar to the aluminum car in size and capacity but is nearly 8000 pounds heavier. Although built principally of steel, a reduction of about 25 per cent in weight compared with that of existing cars has been effected. Quietness in operation, freedom from vibration, rapid acceleration and deceleration and improved heating, ventilating and illumination are its chief characteristics.

Period of Aging for Die Casting Alloy Reduced

All standard zinc-aluminum die casting alloys shrink slightly during the first four or five weeks after casting. After that, changes are so small as to be practically immeasurable. Such is their behavior at ordinary room temperature, according to recent findings by E. A. Anderson and G. L. Werley, New Jersey Zinc Co., Palmerton, Pa. Further observed over a three-year period, expansion starts to develop in some of these alloys between six months and two years after they have been cast.

These changes are of no significance in connection with ordinary uses of die castings, say these authorities. This is because the changes that occur at room temperature are all less than 0.006-inch in bars, 6 inches long, made from different grades of zinc-aluminum die casting alloys.

Zamak No. 3, (A. S. T. M. Alloy XXIII, SAE Alloy 903) containing 4.1 per cent aluminum, 0.04 per cent magnesium and the remainder zinc, after once reaching its maximum shrinkage, undergoes no further dimensional change in excess of 0.0012-inch in a 6-inch length; this holds true whether the die casting be aged at room temperature over a period of years or whether it be indefinitely exposed to 95 degrees Cent. Further findings, of interest to users of precision die castings, show that aging this casting for three hours at 95 degrees Cent. brings the same results as aging at room temperature for five weeks.

It is advisable, therefore, to use this alloy for precision die castings, as well as a stabilizing anneal at this temperature prior to machining them. These authorities also point out that this alloy is virtually unaffected by aging at room temperature or at 95 degrees Cent. so far as impact strength is concerned.

Many Steel and Fabricated Products at Transit Show

MANY new and improved steels and fabricated steel products were shown for the first time at the exposition held by the American Transit association in Cleveland, September 22-27.

Bethlehem Steel Co., Bethlehem, Pa., exhibited a new grooved girder rail section 4½ inches high with 6-inch base. It weighs 105 pounds per yard and was produced at the request of street railway companies to take the place of existing rails weighing 122 pounds per yard.

Subsidiaries of the United States Steel Corp. conducted an extensive exhibit featuring mainly the new Cor-Ten and Man-Ten steels. Included were four blackboards showing design of street railway cars in Cor-Ten steel sections as contrasted with conventional design. The purpose was to show the saving in weight made possible by designing with this alloy. Results of corrosion tests of Cor-Ten steel as contrasted with plain steel also were illustrated by means of samples; they showed high corrosion-resistant properties for this metal.

"Rubber" Wheel Displayed

A new "resilient" electric railway car wheel developed by the Lorain Steel Co., Lorain, O., to the design of the chief engineer of the Electric Railway Presidents' Conference committee was shown. The tire of this wheel was S.A.E. 3140 steel with carbon 0.35 to 0.45 per cent; manganese 0.50 to 0.80 per cent; phosphorus 0.04 per cent maximum; sulphur 0.04 per cent maximum; chromium 0.45 to 0.75 per cent; and nickel 1 to 1.5 per cent. This steel had tensile strength of 90,000 pounds per square inch and brinell hardness of 277. The hub was of S.A.E. 4130 steel. The binding plate was of S. A. E. 1035 steel. The tire and web were supported by two rubber disks and rubber also was used between the rim and the binding plate.

Of equal interest from the standpoint of eliminating noise in the operation of transportation equipment, was a nonresonant gear wheel exhibited by the General Electric Co., Schenectady, N. Y.

Timken Roller Bearing Co., Canton, O., exhibited many tapered roller bearings, including a large bearing with 25-inch bore—one of 52 such bearings for use on the back-up rolls in the hot and cold sheet and strip mill built by the United Engineering & Foundry Co., Pittsburgh, for the Ford Motor Co.

S. K. F. Industries Inc., Philadelphia, exhibited two spherical, self-aligning roller bearings for back-up rolls on a 4-high sheet mill. They had 18½-inch bore and 33-inch outside diameter.

A new air hose coupling produced in automatic screw machines from crucible steel bar stock was exhibited by the Cleveland Rock Drill Co., Cleveland. This coupling previously had been produced in brass and bronze. The company also exhibited a new steel hose nipple, also an automatic screw machine product; previously these nipples had been produced as castings.

Some interesting new track work, including frogs and crossings, was exhibited by Wm. Wharton Jr. & Co. Inc., Easton, Pa., and the Cleveland Frog & Switch Co., Cleveland. Metal & Thermit Corp., New York, exhibited its improved molds for welding track joints.

Exhibit Features Planer

A newly developed rotary planer head was exhibited by the Black & Decker Mfg. Co., Towson, Md. This head is for use on the company's standard portable sander. The head is for cutting wood and is furnished with a curved or flat face. This company also exhibited a new heating gun for heating cold grease in lubricating grease boxes. This delivers air at temperatures up to 400 degrees Fahr.

A new single-reduction unit for use in connection with high speed motors for quick acceleration was exhibited by the Tool Steel Gear & Pinion Co., Cincinnati. The sample exhibited was one that had been operated 132,000 miles on a street car in Cincinnati and the wear on the pack-hardened alloy steel pinions was shown to have been negligible.

A new type of rail joint was exhibited by American Steel Foundries, Chicago. This was a heat-treated steel forging, so designed as to eliminate the battering of rail ends, the loosening of bolts and other joint troubles.

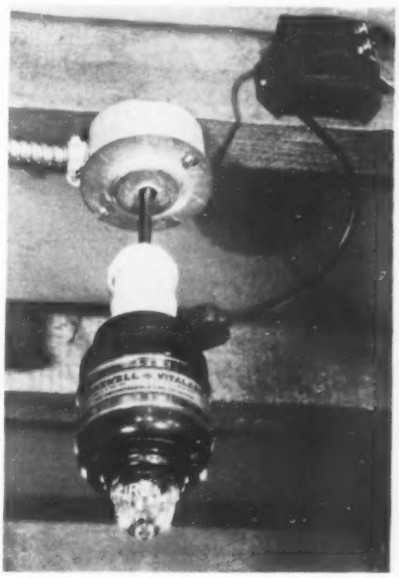
Foote Gear Works, Cicero, Ill., showed a new nickel-chromium-molybdenum axle shaft specially designed for long life on motor buses.

Improved rotogates and newly designed turnstiles, fabricated from steel, were shown by the Perey Mfg. Co. Inc., New York.

Features of the show were four new-type street cars, embodying new principles of construction and operation. Selection of materials and equipment in these cars typified new strides being made in modern railway transportation. Description of three of these cars is given on page 29.

Fire Alarm Uses New Principle

A FIRE alarm built on a new principle recently has been developed by the Gamewell Co., Newton, Mass. Known as the "Vitalarm," this unit has an intermittent howler which gives the alarm whenever there is a sustained temperature rise of 15 to 20 degrees Fahr. a minute. Operation depends on two factors: The "rate of rise" thermostatic principle for speed in detecting a fire and the "fixed" thermostatic principle for absolute assurance that the fire will be detected



Intermittent electric fire alarm for industrial use, operating whenever a sustained temperature rise of 15 to 20 degrees Fahr. is encountered

under any condition. The "rate of rise" feature is provided by means of a small air expansion chamber having a sensitive diaphragm which bellows out when the temperature rises within the air chamber, causing an electrical contact to close, thus sounding the intermittent howler.

The "fixed" thermostatic principle of fire detection, is positive in its operation, and acts as a monitor over the "rate of rise" feature. It consists of a permanent or "fixed" bimetallic thermostat set at 150 degrees Fahr. which will actuate the signal should the temperature rise at a rate of less than 15 to 20 degrees Fahr. until it reaches 150 degrees Fahr. from a slow, smouldering fire of unusual nature. The new fire signal is electrically operated and may be plugged in an ordinary electric light socket, as shown in the illustration above.

Crushed Diamonds Form Abrasive on Wheel for Grinding Carbide Tools

A GRINDING wheel made from genuine South African diamonds and claimed to revolutionize the shaping and conditioning of the hard cemented tungsten carbide turning and boring tools has been introduced by the Carborundum Co., Niagara Falls, N. Y., and will be demonstrated in action at the forthcoming National Metal Congress in New York, Oct. 1-5.

Use of diamonds in grinding wheels has, of course, been influenced by the constantly increasing hardness of various types of tool steel and alloys, as well as by the introduction of cemented carbides. The latter are rated in hardness from 9.12 to 9.14 on the Moh's scale, with the diamond rated at 10.

Diamonds used in the manufacture of the new wheel are not of the so-called black or carbon type. They are yellows, whites and grays of the gem diamond variety, but are sufficiently off-color and in such small sizes or weights as to be undesirable as gems. By a special process the diamonds are crushed and the grains or grits graded accurately through a series of standardized screens.

One of the problems in the perfection of the wheel was the development of a bond that would be at once tenacious, tough and durable—one that would permit the permanent holding of the small diamond particles securely and give them full opportunity to cut. Such a bond was developed in Carborundum research laboratories.

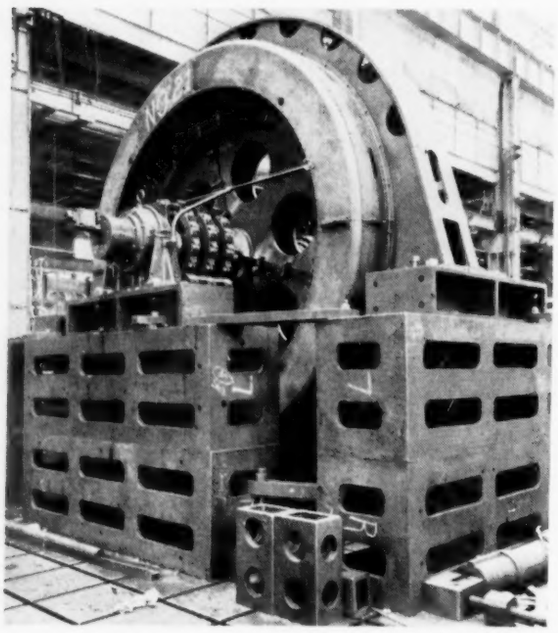
Naturally, regular or solid wheels with diamonds as the abrasive would be prohibitive in cost, so a composition form or backing was devised, to which is applied a coating of the diamonds and the bond. This layer, about ⅛-inch thick, is applied to the side of the wheel form for side grinding and to the periphery of the form for cylindrical and other types of grinding. The wheels then are baked by a special process. Throughout the treatment these wheels must be made to micrometer exactness and balanced to within a fraction of a gram. They are so hard that it is impossible to turn or dress them to size.

Three Grits Provided

The new wheels are made in three grits—comparatively coarse, 90 grit; the fine, 220 grit; and the extra fine, 400 grit. This covers the range of ground finishes from the comparative rough grinding or stock removing to the keen edge or mirror surface finish.

The new diamond wheel is of such a nature as to require the cutting or grinding to be done wet, using preferably plain water or any nonalkaline rustproof solution. An important claim in connection with the wheel is that by using the fine grit wheel the tedious work of lapping cemented carbide tools is eliminated since the new wheel produces a lapped finish of pleasing appearance, with tips having clean, straight edges free from nicks.

Among other applications the new diamond wheels have been used successfully in cutting industrial diamonds commonly used in boring bars of boring machines for the finishing of deep holes to close limits. Limited stocks of the wheels are being carried by Carborundum in 6 and 7-inch diameters, in the three grades for side or peripheral grinding.



LAST PUMP MOTOR FOR FORT PECK DREDGE SERVICE: Motor 21, shown here, was the last of five included in a recent final shipment of motors for dredge pump and booster pump drives on the Fort Peck dam project in eastern Montana. The entire shipment included 42 carloads of equipment. Pump motors are rated at 2500-horsepower, 6600 volts, 60 cycles, three phase, 257 revolutions per minute. They were built by General Electric Co., Schenectady, N. Y., which also has shipped five 700-horsepower waterproof induction motors and five 150-horsepower induction motors for this project

Iron-Cobalt Magnet Alloy Has High Efficiency

A series of electromagnets using cores of the iron-cobalt alloy developed at the Bell Telephone Laboratories Inc., New York, was made and tested recently in the laboratories by G. A. Kelsall. It was found that an electromagnet with a core of 50 per cent iron-cobalt alloy supported a weight of 210 pounds, while one with a pure iron core supported 110 pounds. A magnetizing force of 50 oersteds was used in each case. To give the iron core magnet the same lifting power as the one with the iron-cobalt alloy, it would be necessary to increase the ampere-turns 16 times.

The alloy is quite brittle, making it difficult to roll it into thin sheets. This disadvantage was overcome by adding a third element—vanadium. It was found that up to 2 per cent vanadium did not appreciably affect the magnetic properties.

New Orleans Weld Clinic Is Planned for Oct. 24

Completion of plans for a four-day welding clinic in New Orleans starting Oct. 24 has just been announced by the Linde Air Products Co., New York. This will be the fourth large clinic of this type sponsored by this company this year, the others having been held at Birmingham, Ala., Houston, Tex., and Cleveland. Purpose of the clinic is to pass on to those interested in oxyacetylene welding and cutting information on new developments in the industry; to assist those who have welding and cutting problems; to demonstrate and give instruction on new and old applications of the oxyacetylene process; to afford a chance for discussion and interchange of ideas among those attending.

The New Orleans clinic will be held at the Isaac Delgado central trades school.

Navy Cruiser Misnamed

In connection with an article discussing low-alloy high-tensile steels, by Edwin F. Cone in STEEL for Sept. 24, page 41, an illustration of a new navy cruiser was shown. This was erroneously referred to as the U. S. S. WASHINGTON. The boat shown was the U. S. S. SAN FRANCISCO, 10,000-ton light-armored heavy cruiser, launched March 9, 1933.

Inspection Held Key to Efficiency

A SPECIAL machinery manufacturer which produces duplicate parts by the hundreds of thousands, has determined that its inspection department is the foundation and keystone of its entire manufacturing operations. This is based on the theory that no manufactured part or assembly is any good unless it meets the specific requirements for which it is designed. For instance, if a moving part in a machine is made off-gage, it has to be rejected. Any deviation from tolerances is grounds for rejection.

Study at this plant has convinced the management that inspection must be a great deal more than simply determining whether manufactured parts or products meet specifications. Rather, it is felt, inspection holds the key to making manufacturing operations more efficient. Since the adoption of this viewpoint, a number of the company's best men have been transferred to the inspection department and the director of inspection has much to do with the direction of manufacturing operations.

For instance, a certain part is turned out on a multiple punch press. A blank stamped out of flat wire and inspected to accuracy of dimensions, comes to this press to be receive 10 perforations at one stroke. The dies are set up accurately and the condition as far as the equipment is concerned is all set up for keeping tolerances within 0.001-inch of accuracy. Yet, it was found that a fairly large percentage of the punched pieces had to be rejected because they were off-gage. A careful study showed that the rate of production set for the operators was too high; it did not give them sufficient time to make sure that the blank was solidly up against the gage before punching. Where the production had been 400 pieces per hour, it was reduced gradually and it eventually was found that about 210 pieces per hour was the production rate that yielded fewest rejects and lowest ultimate cost per piece.

In other words, the inspection department not only looks for defects but studies the causes of these defects and works directly with the management in charge of manufacturing for the elimination of the causes. This practice, after only a short period, has been found to be a splendid means of effecting more efficient production methods.

S S S

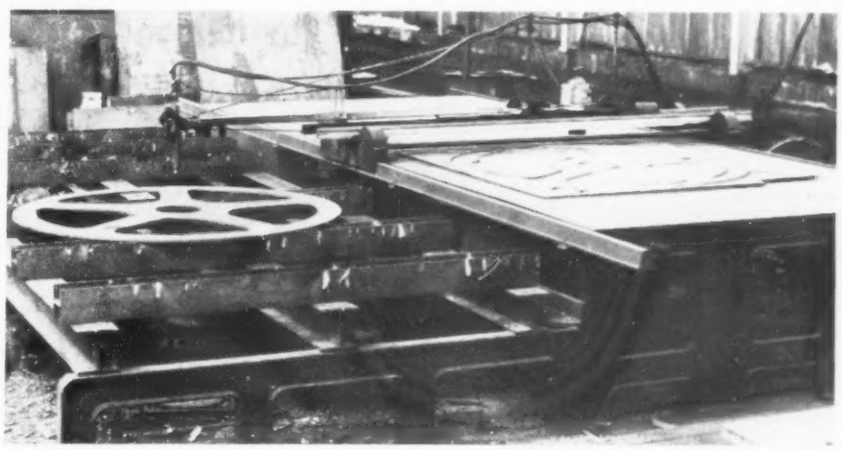
Uses Hydraulic Lift Tables In Washer Spray Booths

A manufacturer of washing machines makes use of hydraulic lift tables in spray booths to elevate washing machine chassis to a convenient height for booth operators. The chassis are rolled into the booths on casters, already attached, and onto the circular tables which are flush with the floor in the lowered position. A valve is actuated, raising the table and machine about 2 feet to a position where the operator can reach all parts of the machine with his spray gun. After the spraying operation, release of the valve lowers the table to the floor again and the sprayed chassis is quickly rolled off the table to make way for the next job.

S S S

Lower Cutting Speeds Aid Work on Stainless

A large manufacturing interest has reached the conclusion that there is no universal cutting lubricant which applies to the range of stainless and high-chromium steels any more satisfactorily than the cutting lubricants employed by turning and threading low-carbon and medium-carbon steels. Bearing in mind that stainless steels have high tensile strength, this interest follows the



STEEL WHEELS CUT TO SHAPE WITH OXYACETYLENE FLAME: The accompanying illustration, by Linde Air Products Co., New York, shows how the oxyacetylene flame is used in shape-cutting wheels out of steel plates on a production basis and at low cost. Wheel template which guides the cutting torch through pantograph arrangement is shown at the right

practice of using cutting speeds about half of those that are used in connection with low-carbon steels. It is believed in this case that trouble with cutting lubricants on stainless steel arises principally from exceeding the speed limit.

S S S

Presses of Welded Plate

Welded steel plate construction continues to gain in the manufacture of all kinds of large drawing and forming presses. Such welded design is being more generally specified by the automotive industry. In response to this demand, a Cleveland manufacturer of four-point suspension presses is furnishing these units in welded construction up to the largest sizes of 600,000 to 700,000 pounds. The fabricating process employed is one of cutting and welding with oxyacetylene equipment.

S S S

Cast Iron Cylinder Liners

Notwithstanding widely scattered experiments with cylinder liners made of forged steel or nitrided steel, it is the opinion of a large diesel engine manufacturer that cast iron is the most suitable commercial material for cylinder liners. For satisfactory service and long life, such an iron must be strong, close-grained, hard, machinable and resistant to growth, heat, wear and corrosion. This manufacturer finds nickel-chromium iron meets these specifications best.

S S S

Steel Electrical Contacts

A manufacturer of electrical appliances has solved the problem of maintaining tension in the contacts of plugs used with electric irons, toasters, and the like, by means of two clips. These clips, made of high-carbon steel, slip over the outside of the plug, which is made in two pieces, and provides the tension which ordinarily must be furnished by the split sleeve contacts. When inserted, the two halves of the plug spread apart sufficiently to permit insertion of the contacts, but still give close union.

S S S

Electric Eye Sorts Cabinets

A unique sorting device is employed in the plant of large electric refrigerator manufacturer for allocating refrigerator cabinets of various styles and sizes to their respective storage sections in the warehouse. As the completed cabinets travel along on the conveyor line from final inspection to the warehouse, they pass an electric eye which automatically throws a conveyor switch, directing each cabinet to its proper storage bay.

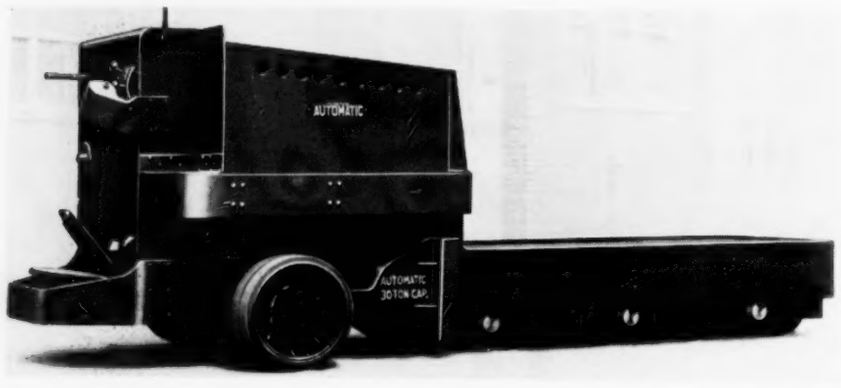
Industrial Truck, Driven and Steered Electrically, Handles 30-Ton Dies

AN ELECTRIC industrial truck specially designed for the handling and transporting of large automobile dies weighing up to 30 tons and over has been installed by the Hudson Motor Car Co., Detroit. The truck, built by the Automatic Transportation Co., Chicago, is said to have the largest capacity ever built into a materials handling unit of this type.

Manual steering has been eliminated by the use of a direct-current motor which actuates all steering wheels with a slight movement of a directional handle. Eight 15 x 7-inch rubber-tired wheels employing fully compensating axles under the load platform afford ample carrying capacity, as the compensating action of the eight trailing wheels relieves the load stress on the frame structure.

Vertical lift by means of roller and wedge mounting elevates the skid on which the dies are carried 4½ inches from the floor while the load is being moved. Full magnetic operation of travel, lift and steer motors is accomplished with the control panel centered at the rear, enabling the operator to maneuver the truck with ease.

Development of a truck of this capacity is expected to enable the automotive and other industries to use larger dies than were previously considered practical, due to the inability to obtain equipment to handle them to and from the presses. In this installation space limitations made it necessary to design the load platform not to exceed 40 inches in width, 90 inches in length and 17 inches in height.



This electrically driven and electrically steered industrial truck is capable of lifting and transporting large automobile dies weighing in the neighborhood of 30 tons

Furnace Treats Tools with Radio Frequency Current

Experiments are being made by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., on the use of radio frequency for heat treating small tools. Radio frequency current from an oscillator is made to pass through a coil about the size of an ordinary coffee cup. The tools to be treated are placed inside of this coil and their opposition to the flow of the radio frequency current through the coil causes them to become heated to the degree required for treatment.

One small model weighing not over 75 pounds was manufactured at the radio division of the Westinghouse company in Chicopee Falls, Mass., and has been used successfully in the treatment of lathe tools, drills and the like. The model as it was arranged was convenient, especially for small quantity production of small tools. Where the ordinary gas furnaces are not available, or where regular furnaces are too costly to start up for only a few tools, this radio frequency furnace is most useful. The coil is connected to the oscillator through a long flexible cable, and by having the tools to be treated arranged in a rack the operator can easily and quickly bring the coil up to each successive piece without removing it from the rack.

Tubes used in the oscillator are of the same type as those used in ordinary broadcasting transmitters.

The frequency of the induction furnace is 375 kilocycles, a frequency

which approaches the lower end of the radio broadcast band. The output of the oscillator delivered to the coil for heat treating is approximately 100 watts. Two tubes are used in a circuit which provides self-rectification of the 60-cycle input power and total input does not exceed 400 watts.

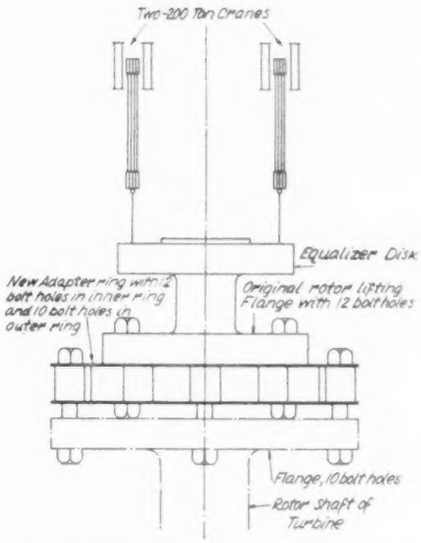
Problem in Weight-Lifting Solved by Steel Adapter and Equalizer Disk

AN INTERESTING weight-lifting problem recently was worked out at the plant of the Beauharnois Power Corp. Ltd., Montreal, Canada. This company installed two Swiss turbines and was under the necessity of providing facilities for lifting the rotors of these turbines. For lifting the rotors of Canadian made turbines, it employed a circular flange with 12 bolt holes which was bolted to the rotor; integral with this flange is an equalizer disk, 60 inches in diameter and cut from 10-inch steel plate, which is engaged simultaneously by two 200-ton cranes.

Adapter for Swiss Rotors

For lifting the Swiss rotors it has installed an adapter which is used in conjunction with the above equipment. The adapter has an inner row of 12 bolt holes by means of which it is attached to the flange used in lifting the Canadian made rotors and it has an outer row of 10 bolt holes which conform to the bolt holes in the tops of the Swiss rotors.

This adapter was built by the Dominion Bridge Co., Montreal. It is 104 inches in diameter and 13 inches thick. Top and bottom covers and inner rings all are made of ½-inch steel plate. The stiffeners are ⅜-inch and ¾-inch steel plate. The weight of the adapter is 8000 pounds, while its lifting capacity is 660,000 pounds. The adapter was fabricated by gas cutting on a radiograph furnished by Railway & Engineering Specialties Ltd., Montreal, and the joints were gas welded.


Two-200 Ton Cranes
Equalizer Disk
New Adapter ring with 12 bolt holes in inner ring and 10 bolt holes in outer ring
Original rotor lifting Flange with 12 bolt holes
Flange, 10 bolt holes
Rotor Shaft of Turbine

How the weight lifting members are assembled to handle heavy rotors

Address Is Corrected

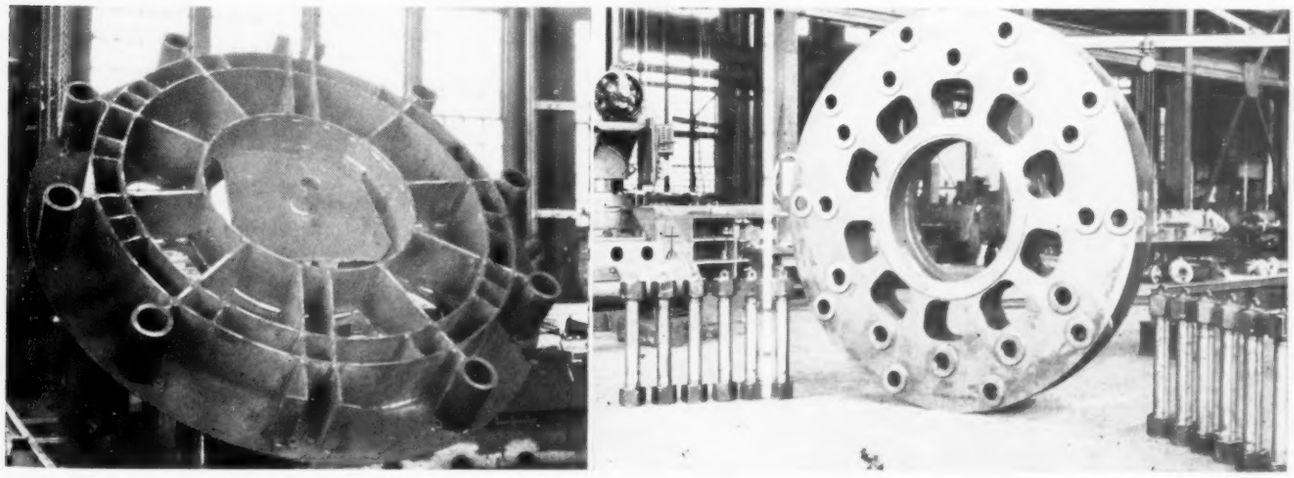
The list of exihibitors in the National Metal exposition, appearing on Page 113 of the Sept. 24 issue of STEEL, gave the address of the Ferrous Magnetic Corp., manufacturer of magnetic inspection equipment, as Long Island City, N. Y. This was an error; the correct address of the corporation is 110 Washington street, New York.

Vanadium Lengthens Life Of Metal Stamping Dies

Vanadium in cast iron stamping dies for sheet metal has proved to be one of the outstanding alloy iron developments when costs of production operations are involved. Vanadium in the amount of 0.20 per cent increases the life of such dies appreciably and, as a result, a great saving is made in press time through elimination of shut-downs for reworking the dies. A total carbon content of 3.50 to 3.70 per cent, with 0.50 per cent combined carbon, and about 0.50 per cent nickel content, is recommended for these dies. Dies of this type are used by the largest manufacturers of large sheet metal automobile parts, such as fenders, splash guards, radiator shells, and the like.

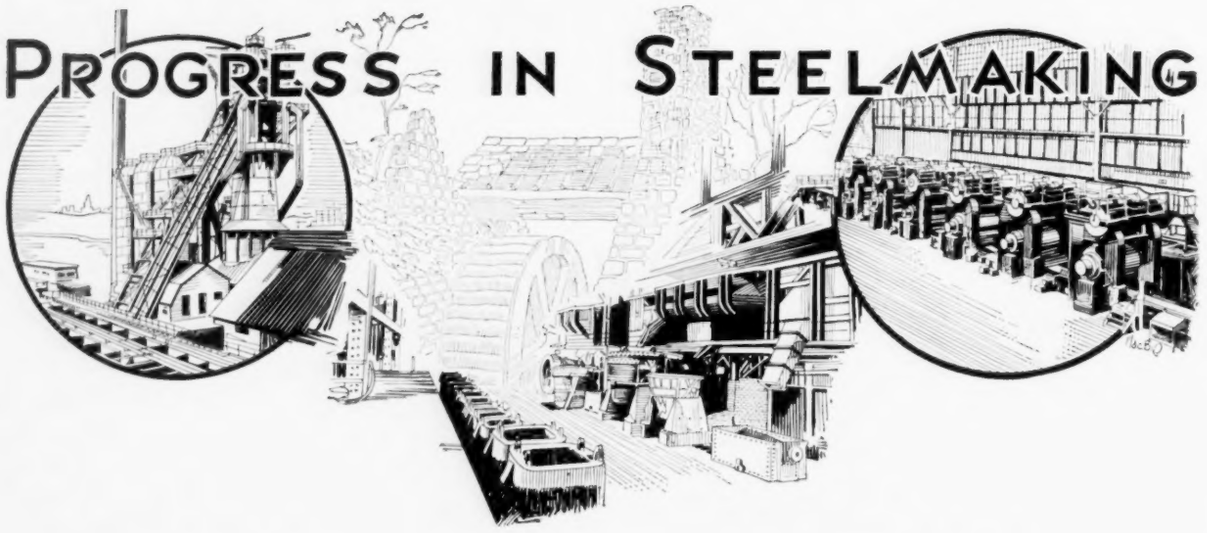
Safety Equipment Industry Health and Safety Code

Standards for safety and health for workers in the industrial safety equipment industry and trade have been prepared and adopted by the code authority for that industry. The standards cover lighting, ventilation, sanitation, dust, fumes and gases, working with poisonous materials, machine guarding, protective clothing and building equipment and construction. The code authority of the industrial safety equipment industry and trade has its headquarters at 7 East Forty-fourth street, New York, with W. J. Parker as secretary-treasurer.



Fabricated welded steel adapter made by Dominion Bridge Co., Montreal, for use in lifting heavy turbine rotors in a public utility plant. Left view shows the adapter under construction and right view shows the completed adapter together with the bolts by means of which it engages the rotors

PROGRESS IN STEELMAKING



COST of cleaning billets by impelling abrasive material against the surface of the steel varies according to the size and number of surfaces. Billets, 2 x 4 inches, have been cleaned on one side only for $0.20 a ton. Billets, 4 x 4 inches, can be cleaned on all sides by this method for $0.94 a ton, according to estimates of one company which compares with a cost of $1.34 a ton for pickling the same material.

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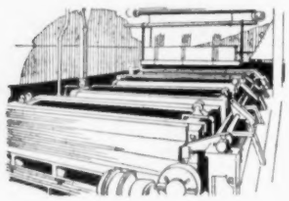
Numerous charred and waterlogged pickling tanks confined to the scrap heap have been restored to



service by the application of a coating material. One user of this compound recently effected an annual saving of $10,000 in pickling tank maintenance.

• • •

A steel company in the Pittsburgh district recently evolved a method of removing risers from cast steel rolling mill guides. The cutting operator had difficulty in removing the risers by oxidation and hence removed them by grinding and breaking. The risers were rectangular in cross section, 2 to 4 inches thick and 8 to 12 inches long. Analysis of the steel was: Carbon 1.50, manganese 1.45, chromium 16.00, phosphorus 0.03, sulphur 0.04, nickel 2.50 and molybdenum 0.70 per cent. The technique finally developed for serving the risers by oxidation included the use of an oxyacetylene torch with a six-preheating-hole tip, with the oxygen pressure about 10 per cent higher than necessary for cutting mild steel of the same thickness. A neutral preheating flame was used, as a carburizing or oxidizing flame would have proved refractory. The risers were preheated to a bright red across the line of cut, after which the preheating flames were pulled about $\frac{1}{2}$-inch away from the metal, this being necessary to give the cold cutting oxygen a chance to heat up. The cutting then was done with rapid up-and-down motions in the case of horizontal cuts, and forward and backward motions in the case of vertical cuts.

• • •

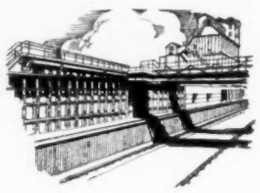
Instead of applying two $1\frac{1}{2}$-inch coats of insulating material on the roof of the checker chambers and a 3-inch coat of dry granules followed by a 1-inch coat of insulating material on the furnace roof, an open-hearth shop in the Chicago district has changed its practice. The present procedure for checker chamber and furnace roofs is to apply a $1\frac{1}{2}$-inch coating of granules and then a course of $2\frac{1}{2}$ inches of insulating brick, and cracks between the bricks being sealed by fine granulated insulating material. The latter procedure afforded an 80 per cent salvage of the insulating brick whereas only about 40 per cent of the insulating material used in the first type of construction was recovered.

• • •

Better tin cans with decreased loss from breakage in the dies and at a lower production cost are claimed for a new grade of tin plate by virtue of its ability to flow under pressure. The new product is made in coils on a 4-high mill, its thickness not varying in excess of 0.002-inch across its width. Because of the fine grain structure the surface remains smooth and the tin coating undisturbed.

• • •

Bone ash used as a mold coating affords only a fair ingot surface, according to tests conducted at an Ohio open-hearth shop. Nor is the ingot surface made any more attractive by the application of talc, alum and water glass, glycerin or rosin smoke to the mold.



Floors of by-product coke ovens may be maintained in a tight condition by floating special type cements over the old brickwork rather than by replacing the old floor brick with new. Only a thin layer of the cement is required.

• • •

Sheet steel up to 22 gage can be cut into any desired shape by an electric hand shear recently marketed in England. The shape of the foot which holds the stationary blade permits cutting curves of small radius. The moving blade is motor driven at 1300 strokes a minute. The cutting speed ranges from 10 to 20 feet per minute depending upon the thickness and temper of the work. The edges are claimed to be free from burrs. Power consumption is about 50 watts.

TIGHT FOR 8 YEARS

..what a TANK!

Sulphuric acid pickling tank constructed of long leaf yellow pine timbers with Monel Metal tie-rods, lugs, washers and nuts. Built for the Petroleum Iron Works, Sharon, Pa., by Hauser-Stander Tank Co., Cincinnati, Ohio. This tank with 8" wall timbers has inside measurements of 30" wide x 10 ft. 6" deep by 32 ft. long.

No 71
Pickling Equipment that passes the test of service

And it looks good for 8 years more, thanks to tie-rods, lugs, washers and nuts . . . . all of MONEL METAL

IT'S hard enough to make a pickling tank that's tight in every seam and joint on the day it's built.

It is quite another matter to build one that is still tight and leak-proof after 8 years of pickling with sulphuric acid . . . and still good for many more years on the same job.

Hauser-Stander Tank Co. of Cincinnati did just that when they built the tank shown above . . . did it by precision planing of each and every timber. The finished timbers are not only squarely true in section, but the faces are plane and flat for their entire length. Opposite faces are parallel throughout. This means the tank can be first assembled acid tight with minimum rod tension. Acid cannot leak between the joints to start undermining their integrity. Then they used tie-rods, lugs, washers and nuts all of rolled Monel Metal.

Monel Metal is so tough and so strong that tie-rods of this Nickel alloy can be "taken up" if necessary later after a drying period without fear of stripping the threads or of stretching the rods.

And Monel Metal so stubbornly resists the action of both acid and alkali pickling baths, whether hot or cold, that Monel Metal tie-rods are often salvaged from old tanks and used over again on new ones.

We shall be glad to send you actual reports, not only of Monel Metal tie-rods, but also of Monel Metal pickling baskets, that demonstrate the kind of gruelling conditions this equipment can stand. Just drop us a line.

THE INTERNATIONAL NICKEL COMPANY, 67 Wall Street, New York, N. Y.

Monel Metal is a registered trademark applied to an alloy containing approximately two-thirds Nickel and one-third copper. Monel Metal is mined, smelted, refined, rolled and marketed solely by International Nickel.

Monel Metal

Discusses Various Type Fuels For Steel Mill Application

OPEN-HEARTH furnaces require a flame of extremely high temperature which can be controlled exactly, both in shape and in placement, so that heat transferred to the bath may be maintained at a high rate and at the same time destruction of the furnace may be minimized. This was brought out by H. V. Flagg, combustion engineer, American Rolling Mill Co., Middletown, O., at the annual meeting of the Association of Iron and Steel Electrical Engineers held last week at Hotel Statler, Cleveland. A running report of the earlier technical sessions was presented in last week's issue of STEEL.

Soaking pit heating is relatively a much slower heating operation but still is carried to a fairly high temperature, Mr. Flagg contended. The heat transfer requirement, therefore, is best met by a flame of moderate temperature and large gas volume, with high heat transfer characteristics and at the same time without undue tendency to cut or wash.

Low Temperature Is Used

In continuous furnaces, the heat transfer must be so organized that the final stages of heating are accomplished at a low temperature difference between furnace, flame and stock. In batch furnaces for either reheating or annealing, where the stock is charged cold, the use of a low flame temperature, large gas volume fuel results in a slow, loggy heating-up period. For such an application a rich fuel with high flame temperature and rapid flame propogation characteristic, which can be manipulated to produce a luminous flame, has advantages, the speaker contended.

In an open-hearth furnace a momentary lapse in heat application at a critical period may affect both the time of heat, the yield and the quality of the steel out of all proportion to the magnitude of the lapse. In reheating furnaces, changes in temperature may go unnoticed and the heating of the stock become progressively worse until mill operation must be interrupted while furnace conditions are being corrected. Most heaters, in their efforts to avoid such a contingency, tend to carry their furnaces at temperatures in excess of what actually is required which has adverse effects on yield and fuel consumption.

Control of temperature and control of atmosphere are related closely in that each is influenced by the same factors. Total heat transfer rate is affected by variations in atmosphere as well as by variations in temperature and of circulation of gases, especially if the luminous flame is employed. While it is important that the atmosphere best suited for heat transfer be established and maintained, atmosphere also is important because of its influence on the quality of work accomplished.

Oxidation Is Unavoidable

It is universally accepted that oxidation of steel is inevitable in a conventional atmosphere made up of carbon dioxide, carbon monoxide, hydrogen and water vapor at flame temperature. The character and the amount of the scale formed by such oxidation can be controlled within limits by the composition of the atmosphere used so that the skillful heater manipulates his furnace atmosphere to produce a scale best suited for the particular operation with which he is employed. Various factors affecting atmosphere, therefore, must be under close control.

Fuels commonly used in a steel mill include natural gas, coke oven gas, blast furnace gas, mixed gas, producer gas and fuel oil. From the standpoint of utility, natural gas approaches the ideal fuel. Where available, the supply usually is fairly stable, especially since the advent of a network of pipe lines connecting widely separated gas fields. Distribution about a plant is simple and expense for preparation or handling is practically nil.

Steel plants having coke plants, have at their command a satisfactory fuel for general purposes. If the supply is sufficient to take care of loads over peak demand, the problem of profitably using all the gas during periods of low demand is apt to be trying. The relatively low carbon content of coke oven gas makes it extremely difficult to establish luminous flame conditions, which is a marked disadvantage. Application of automatic control with coke oven gas is not difficult provided the gas has been cleaned adequately and the supply is stable.

Blast furnace gas has not had widespread application as a steel mill fuel but there has been a growing realization of its value for some years. The most extensive use of this type gas, outside of stove and boiler fuel, is for mixture with coke oven gas to make a fuel of about 250 B.t.u. per cubic foot for general steel mill use. Mixed gas from all standpoints approaches most nearly the ideal as a general, all-purpose fuel.

Fuel oil has found steadily increasing application in steel mills in recent years due to its wide-flung supply, its low cost and its adaptability to many operations, particularly the open hearth. In the quantities used in an open-hearth furnace, oil is easily controllable, lends itself to the development of extremely high heat transfer, makes for high furnace production and high yield, furnace construction is simple and relatively inexpensive, furnace life is long and repair cost is low.

Little Gain Is Recorded

Through the changing conditions of the last few years, producer gas has made little gain as an all-purpose fuel and has even lost considerable ground in the open hearth since the advent of heavy fuel oil at relatively low cost. The scaling effects of a properly organized producer gas flame will compare favorably with any carbonaceous fuel, for the scale is moderate in amount and of a character which handles well and still cleans easily.

Arthur G. McKee, president, Arthur G. McKee & Co., Cleveland, in speaking on "The Development of the Modern Blast Furnace" mentioned that the Perry stack at Erie, Pa., was one of the last vertical hoist furnaces to be built in this country. He traced the development of blast furnace design by drawings thrown on the screen and then discussed at length the dead space which exists in blast furnace boshes and hearths. He presented a design of a furnace with a 20-foot hearth and a 24-foot bosh having 20 tuyeres on 3-foot centers, pointing out that the stock would move down through high-temperature combustion zones. If blown with enough air, he contended, a furnace of this type should make as much iron as any of the larger furnaces.

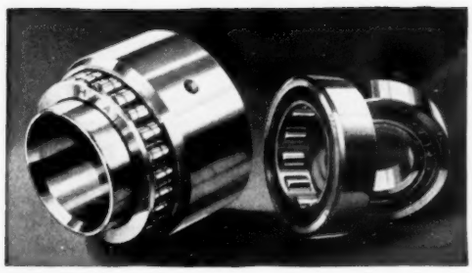
He warned that when blast furnace stoves were kept on the furnace for two hours and then put on gas for four hours that stack temperatures would be high and the operating efficiency of the stoves on a low

By Comparison . . .

A GNAT'S EYEBROW *would resemble* A SHOE BRUSH

A feeble attempt at wit—No, merely an effort to help you to visualize the accurate gauging that goes into the precision manufacture of Hyatt Roller Bearings.

So powerful and finely calibrated are some of the optical measuring instruments at the Hyatt plant, that a high degree of accuracy to 1/200,000th of an inch is possible in the inspection of our tools and gauges. Using the same measure of perfection, a gnat's eyebrow would look like a shoe brush.



The best materials, plus the most advanced designing, would go for little without this super-positive control of accuracy—an accuracy that has distinguished Hyatt Roller Bearings for over forty years, placing them in first choice position of machine and equipment builders and users alike. Hyatt Roller Bearing Company, Newark, Detroit, Chicago, Pittsburgh, Oakland.

HYATT

ROLLER BEARINGS

PRODUCT OF GENERAL MOTORS

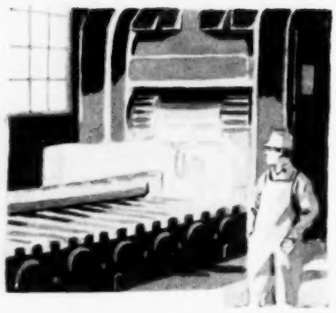
basis. Increased efficiency in the operation of blast furnaces is effected through the use of high hot blast temperatures. Many furnaces, he stated, now are operating on higher hot blast temperatures than formerly, pointing out that 1200 degrees Fahr. probably is the average stove temperature used in this country today. With the use of insulation, however, Mr. McKee was of the opinion that furnaces in the near future probably would operate on temperatures of 1700 degrees at the tuyeres. Operating the stacks on high temperatures at the bottom of the furnace is conducive to lower temperatures at the furnace top.

In discussing Mr. McKee's paper, one blast furnace man did not share the opinion that an inactive space between the tuyeres on the inside of the furnace exists. At one time, he stated, he operated a stack with 16 tuyeres but this later was abandoned in favor of a 10-tuyere furnace with good tonnage output. There is no reason why a stack should have a stockline of 25-foot minimum if the hearth is 25-foot diameter, he contended. A 28-foot hearth could be filled with a 25-foot stockline although he warned this could not be accomplished with a large bell. Experiments, he pointed out, disclose that a 25-foot top gives good distribution of stock. In the design of furnaces today, the speaker contended, a ratio of the top diameter with hearth diameter of 1 to 1 should be considered as making for efficient operation.

Effects High Efficiency

Developments in steam plant design over the past decade coupled with turbines suitable to the expanding energy range, have resulted in the realization of high efficiencies, stated A. G. Darling, industrial engineering department, General Electric Co., Schenectady, N. Y. He spoke on "Superimposed Steam Turbine Generator Plants for the Steel Mill." Some examples of present-day plant conditions, he pointed out, show how the imposition of a high-pressure boiler and turbine generator will affect the fuel and water treating costs or the plant electrical output. Improvements indicated lead to the conclusion that, for similar cases, the possibilities are sufficiently attractive to suggest a close investigation of the superimposed plant. Resort may be made to the use of evaporators, he pointed out, in order to secure the necessary purity of boiler feed water at some reduction in operating savings, but, from a technical standpoint, chemical treatment with elimination of precipitated solids appears to be a feasible solution to this vital problem.

With less expensive electrical power, the applications of mechanical



power by steam will be less attractive; in many cases to the extent that some may show greater economy if changed to electrical drive. Electrical heat treating, welding, and other uses continue to add to the value of metal products and produce a higher electrical consumption per unit of product, so reducing the generating reserves and tending toward the expansion of the electrical power plant. The need for added, less expensive electrical power is increased by these means. In conclusion the speaker stated that the superimposed steam turbine generator plant offers the possibility of an economical means to meet these demands.

Contact on Higher Plane

Furnace proportions and methods of construction have been improved so as to give a much better contact between heating gases and the work, stated A. J. Boynton, vice president, H. A. Brassert & Co., Chicago, in speaking on "Use of Automatic Control on Metallurgical Furnaces." New burners changed both in design and location assist in determining the size, shape and direction of flame. Insulation, he pointed out, has prevented heat losses while at the same time making the furnaces substantially air tight against the existing differences in pressure.

Furnace control should be fully automatic and should require attention only as the conditions in the furnace require to be changed. Regulation, he stated, may be applied to any fuel in such a manner that compensation is effected for variation in one or more of the other fuels. A truly automatic regulation of fuel should be based on the temperature of the furnace or the work within the furnace rather than on an arbitrary inflow of heat. Means now are completely developed, he stated, whereby regulation of the temperature of the open-hearth roof may be controlled.

Regulation of furnaces produces a fuel economy of 10 per cent or more.

It is probable that for every cent saved in fuel, another is saved in repairs. The cost of regulation is small compared either to the value of furnace or output. In conclusion the speaker pointed out that automatic regulating equipment, if practically designed, is capable of making the greatest possible saving per dollar invested of any presently possible furnace improvement.

In speaking on "Theory and Practice of Immersion Heating With Gaseous Fuels," E. B. Dunkak, vice president, C. M. Kemp Mfg. Co., Baltimore, announced that a heating element of the recirculating type has been found most efficient since the high velocity flame entrains a portion of the cool products of combustion, thus tempering the flame zone and preventing local overheating of the element walls.

Shape May Be Varied

The shape of the heating element may be varied considerably to adapt it to the shape of the container and the requirements of the job, he pointed out. Similarly the size of the elements, the number employed and their location in the pot are individual problems with each job, but experience has shown that immersion heating with gas has reached a point where requirements may be met and controlled accurately. Hot galvanizing and steel finishing in general are two new fields which hold promise for immersion heating. The advance of this type heating, the speaker stated in conclusion, is dependent to a large extent upon the co-operation that these industries are willing to extend.

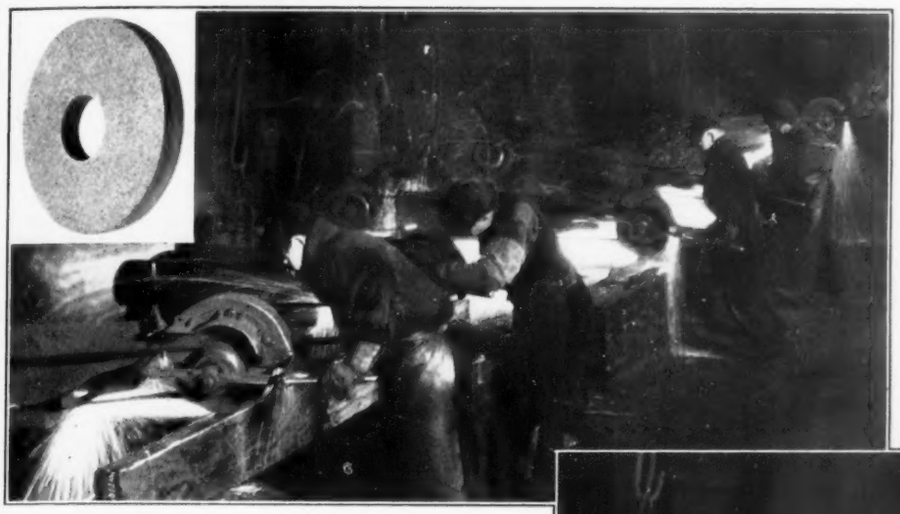
The final session was brought to a close by the presentation of a paper entitled "Propane and Butane as Industrial Fuels" prepared jointly by E. A. Jamison, eastern manager, Phillips Petroleum Co., Philadelphia, and W. H. Bateman, propane engineer, Sun Oil Co., Philadelphia.

Trade School Starts Courses In Arc Welding Practice

Milwaukee School of Engineering, Milwaukee, has instituted a series of courses in arc welding through the co-operation of the Harnischfeger Corp., Linde Air Products Co., and the J. D. Adams Mfg. Co., Indianapolis, which have installed complete laboratory facilities for all types of welding work. Courses range from practical arc welding to a curriculum designed for shop superintendents in welding practice as applied to industry.

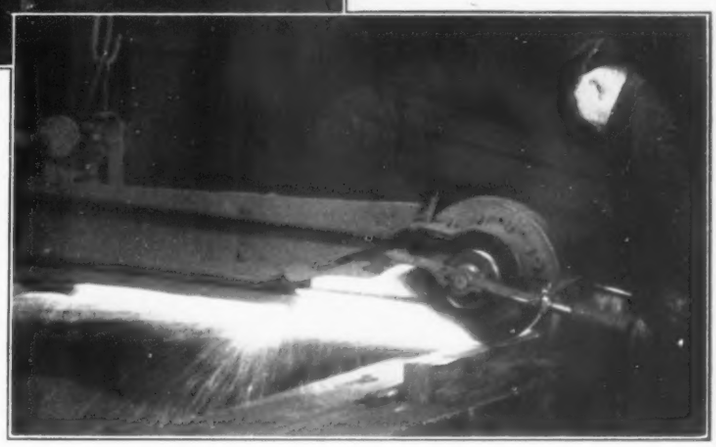
On the lecture and shop staff are: Klaus L. Hansen, inventor of the Hansen arc welder and consulting engineer of the Harnischfeger Corp., now manufacturing the unit; W. V. Emery, welding superintendent of the same concern; O. W. Werwath, president of the School of Engineering; Ewald L. Wiedner, instructor in electricity; John Hopkins and David Clark. The regular fall class began Sept. 17.

MACKLIN
BILLET CUTTING
WHEELS



Are supplied in ever increasing numbers to steel mills with reduced costs, in some cases, resulting from their use, as much as $1.50 per ton.

The fact that most large mills are using Macklin products is the best proof possible that billet grinding is a Bakelite Wheel job. Macklin wheels are specified for grinding a wide variety of alloy steels, including stainless steel, for grinding checks and for surfacing billets.



As illustrated above Macklin Billet Cutting Wheels are extensively used on big production jobs. They are operated safely up to 9500 surface feet per minute. They assure fast cutting and since Macklin wheels last a long time on any kind of a job, and because they effect worth while savings you doubtless will want to know more about them. One of our representatives will gladly call and give you full information.

MACKLIN GRINDING WHEELS

MACKLIN COMPANY

Manufacturers of Grinding Wheels

JACKSON, MICH. U. S. A.

Sales offices—Chicago—New York—Detroit—Pittsburgh—Cleveland—Milwaukee

Engineers Review Progress Recorded in Welding

DEVELOPMENTS in welding were reviewed in two sessions during the annual convention of the Association of Iron and Steel Electrical Enginers in Cleveland, Sept. 18-20. These sessions, sponsored by the association's welding engineering division, and presided over by G. A. Hughes, electrical engineer, Truscon Steel Co., Youngstown, O., indicated by large attendance the widespread interest of the steel industry in the various types of welding.

As an introduction to the technical papers, Mr Hughes commented briefly on the advances of the past year in both the art of welding and new equipment. Included among them were metallic arc welding with alternating current; new shielded arc electrodes which give higher physical properties; improved technique for welding stainless steel; remote control for starting and stopping arc welding generators and for regulating the amperage; electronic control for the timing of resistance welds, both spot and seam; and greater use of flash welding in the fabrication of automobile bodies.

Effect of Nitrogen

Nitrogen exerts a profound influence upon the quality of arc welds; it increases tensile strength and at the same time reduces ductility. For that reason, a considerable amount of research work has been done in recent years to determine the exact effect of nitrogen and how its quantity can be controlled in weld metal. One of the investigators on this subject has been Dr. J. W. Miller, metallurgist, Reid-Avery Co., Dundalk, Md., and in a most complete paper he reported upon his research and conclusions.

Dr. Miller found that the nitrogen content of metal deposited by the metallic arc might be diminished by: Increasing the carbon content of the electrode; increasing the amperage; decreasing the arc length (voltage); increasing the diameter of the electrode; decreasing the nitrogen content of the atmosphere; or using heavily coated electrodes. It was found that nitrides might precipitate at the grain boundary or within the grain itself and might also cause widened grain boundaries.

The author believes that carbon monoxide and hydrogen, with perhaps the assistance of hydrocarbons, are responsible for the blowholes occurring in metallic arc deposited weld metal. No difference in the nitrogen content was found in welds produced by annealed and hard-drawn electrodes. Furthermore, conditions which lead to the absorption of nitrogen are conditions which lead to the burning out of carbon and the contamination by oxygen.

A conclusion reached by Dr. Miller was that nitrogen alone will not account for all of the inferior properties found in some welds. Other factors, such as heat treatment, grain size, microstructure, carbon content, manganese content, oxygen content, etc., play an exceedingly important part in controlling physical properties.

In presenting a paper on oxyacetylene welding and cutting in metalworking, W. S. Walker, Linde Air Products Co., Cleveland, stated that some of the first applications, dating back 30 years, were made in the steel mill and foundry. Recent developments, he said, include use of a carburizing flame and a new technique for steel welding; perfection of bronze welding rods which give higher strength welds in repairing cast-iron, malleable and steel machine parts; methods for welding brasses and bronzes formerly thought to be unweldable; better methods for welding the chromium and chromium-nickel corrosion-resisting irons and steels; great increase in hard facing practice; and demonstration that flame machining is commercial.

The new method of steel welding is being used widely for making pipe joints; in many instances, stated Mr. Walker, production has been tripled and quadrupled. The method also is being applied successfully to plate and tank work and to tubular aircraft joints. Regarding the new bronze welding rods developed recently, the speaker declared they do less fuming and provide greater comfort for operators.

Mr. Walker enumerated some of the applications of hard facing, which are increasing steadily. Among them is the use of stellite on guides for rail and bar mills; so surfaced, these guides are giving several month's service instead of one week's for unsurfaced guides. Blast furnace tap hole augers hard surfaced with stellite show a life ratio of 6 to 1.

The speaker explained flame machining by comparing it with torch cutting. In the latter the torch is held vertical; in flame machining, it is tipped to an angle of less than 30 degrees to the horizontal to give a scooping action similar to a chipping hammer. It is claimed to be an exceedingly rapid method for removing metal. For drilling and boring operations, however, the method is not completely commercialized.

One of the new applications for the torch is that of centering billets for the piercing mill in seamless tube manufacture. As compared with the procedure of cold drilling, the flame centered billets are said to be more economical and because of the lack of scale in the hole extends the life of the piercing mill.

Reports High Physicals

In the course of discussion of this and the preceding paper, A. E. Gibson, chief engineer, Wellman Engineering Co., Cleveland, spoke of some unusually high physical properties which he had obtained in testing an all-weld metal specimen. The material, a new heavily coated rod designed for arc welding high tensile steels, showed a yield point of 92,000 pounds per square inch, an ultimate strength of 111,000 pounds per square inch and an elongation in 2 inches of 26 per cent. The specimen had been stress relieved at 950 degrees Fahr.

Considerable interest was displayed in a paper which D. I. Bohn, electrical engineer, Aluminum Co. of America, Pittsburgh, presented on recent developments in welding aluminum alloys. Although these alloys have properties similar to steel in many respects, their thermal and electrical properties differ so greatly as to make usual welding procedure unsuitable. These alloys depend upon heat treatment for their strength, thus areas subjected to welding heat are effected and sometimes impaired.

Metallic arc welding, although comparatively recent, is being favored for many applications; it provides a narrower annealed zone than is obtainable with torch welding. Arc welds are likely to be porous, but in many cases this makes no difference, consequently this method probably will be used for general structural welding.

Such excellent results have been obtained with the automatic carbon arc that the method likely will increase in favor for types of work such as large tanks. Spot and seam welding have reached the stage where with proper equipment results comparable to those obtained with steel may be expected. Electronic equipment is available which fulfills the necessary requirements.

Boron Carbide—New Wear-Resisting Abrasive Product

BY RAYMOND R. RIDGWAY
Norton Co., Chippawa, Ont.

A PRODUCT called boron carbide has been on the market for some years as a metallurgical source of boron. Chemical studies of such samples have shown a composition about as shown in Table I.

Microscopic and physical studies of these samples have shown that they were composed largely of free graphite, metal borides mixed with metallic boron, and some combined carbon. Such a product is without value for the abrasive field, since it consists of a mixture of a small volume of material that has some abrasive properties with a large volume of graphite that has lubricating properties.

For many years the attention of the research laboratory of the Norton Co. has been directed to the study of the combinations of boron and carbon with the result that a product has been produced which consists entirely of crystalline abrasive boron carbide in a stable form with discrete crystals large enough to be used for abrasive purposes. The product, manufactured according to U. S. Patent No. 1,897,214, has an average composition closely approximateing the formula B_4C, which is a definite crystalline compound and which has been found to have unusual and characteristic properties of special value in our industry. This product has been subjected to commercial experimentation for several years and has now reached a stage where it can be produced in commercial quantities available for a wide number of uses in the arts.

The process is similar to the manufacture of silicon carbide in that a resistance type furnace is used because of the graded temperature zones such a furnace contains.

The zones make possible the preparation of a carbide product of very high melting point from a raw material such as boric acid which is volatile and which, when reduced, gives a metallic compound that is also highly volatile at the temperature of reaction. The volatility of the reaction products involved explains why investigators have had great difficulty in preparing the carbides of boron uncontaminated with free graphite, since the boron constituent was largely lost in the furnacing process. This meant great losses of valuable starting material, and tended to make the yields low and the cost of the product out of reason. The control of composition was necessarily erratic. In the resistance furnace process as carried out at the Norton Co., the losses of boron from the process are so small as to be negligible and hardly exceed the losses in the ordinary silicon carbide process. The commercial practicability of the new carbide is based on this fact.

The accompanying article is from a paper presented at the sixty-sixth general meeting of the Electrochemical society, New York, Sept. 27-29, 1934. The author is research engineer, Norton Co., Chippawa, Ont., Canada.

Table I

"Boron Carbide" Analysis as Formerly Produced

	Sample A Per Cent	Sample B Per Cent
Total boron	54.6	54.4
Total carbon	41.5	41.8
Fe	1.2	1.7
Si	1.2	0.5
Ti	0.4	0.8
Ca	0.4	0.4
Al	0.4	0.6

Table II

Composition of the New Boron Carbide

	Per Cent
B_4C	97.0
Free graphite	Trace
Boron, free and as borides	2.0
Iron	0.4
Aluminum	0.2
Silicon	0.3
Calcium and magnesium	0.1

The first step in the manufacture of boron carbide is the dehydration of commercial boric acid, which is more economically carried on outside of the final furnacing operation. The anhydrous glass is produced in a separate simple furnace (U. S. Patent No. 1,893,106). The glass is then combined with high purity coke in a special resistance furnace in much the same way as coke and sand are used for the manufacture of silicon carbide. A central heating core is provided and the surrounding mixture is heated up to the reaction point which is about 2500 to 2600 degrees Cent. A cylindrical ingot of boron-impregnated crust encloses a zone which consists largely of freely developed crystals of boron carbide. Inside of this zone there is a zone of molten carbide which fuses and forms a thick ingot.

This is a characteristic difference from silicon carbide which appears in the furnace process only in a vapor or crystalline phase without the intervening liquid phase. The melting to form a molten phase is one of the unique properties of this carbide abrasive and makes possible the special applications which are described later.

The separated product is sorted into zones and classified for the various uses. Typical furnace product will have the chemical composition shown in Table II including the impurities which are probably traces of metal borides. The composition of the separated product can be controlled by careful zone clasification, certain products being more useful for special applications.

Table III

Resistance to Compression

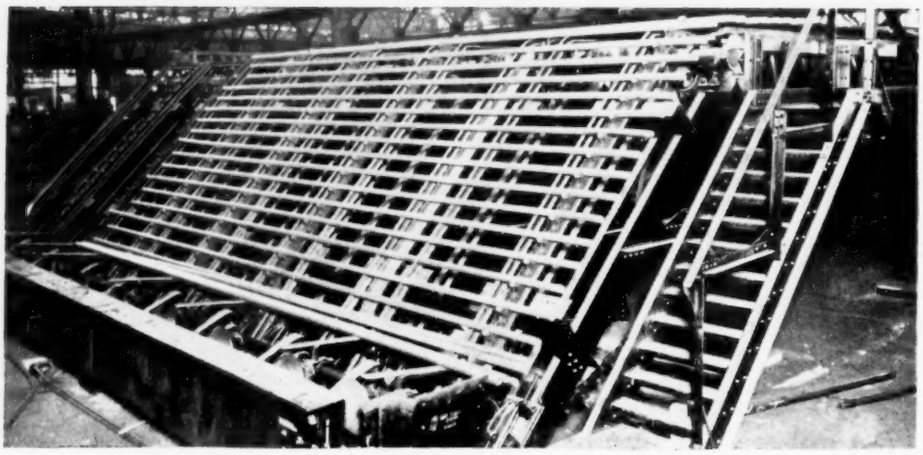
Material Tested	Average Modulus of Rupture in Compression lbs./sq. in.	kg./cm.²
Molded B_4C	260,000	18,000
Dense SiC	82,000	5,800
Crystalline Al_2O_3	75,000	5,300
Artificial ruby	42,000	2,960
Optical quartz	58,000	4,100
Spark plug porcelain	72,000	5,100
Fused silica	38,000	2,700
Fused magnesia	21,000	1,500

From megascopic and microscopic observation of well-crystallized specimens, particularly of isolated single crystals adhering to a ground-mass of finely crystalline material, boron carbide has been tentatively identified as belonging to the hexagonal crystal system.

The new product shows an intrinsic hardness much in excess of silicon carbide. The products readily scratches silicon carbide and can be used to lap down thin sections and polish crystals of silicon carbide the same as can be done with

REX CHAIN

FOR EVERY DRIVE & CONVEYOR



STEEL MILL CHAINS THAT WEAR LONGER

REX Transfer and Cooling Rack Chains

Rex Chabelco Chains retain their accuracy of pitch and maintain the attachments in proper alignment even under unusually severe operation on transfer and cooling racks. Here again, careful manufacture and the unit link principle make Rex Chabelco Chains wear much longer.

REX Catching and Feeding Table Chains

Rex Catching and Feeding Table Chains are made in both alloy steel and Z-Metal. Rex Alloy steel chain No. 587, commonly used for this service, is an all-steel roller chain which operates on 88 sprockets. This chain maintains its accuracy due to the unit link principle by which the carefully machined parts of this chain are assembled. It stands the wear of running at relatively high speeds with reversals in direction of from 30 to 40 times per minute. Rex Z-Metal Chains are also used for this work.

To secure maximum wear with these chains on catching and feeding tables, we recommend Rex Alloy Temperim Sprockets with anti back lash teeth.

Other REX Chains

Rex Roller Chain—The most highly finished steel chain for high speed drives. Available in standard sizes in single or multiple strands. Rex Roller Chains meet the requirements for practically any high speed plant or duplicate machinery.

Rex Z-Metal Chain—Rex Z-Metal Chain is 30% stronger than malleable and is cast in the same numbers. It shows greater resistance to corrosion, abrasion and pounding. It is widely used in plants and machine assemblies. Rex Z-Metal is frequently the solution to malleable chain difficulties.

Chain Belt Company also makes a complete line of other standard sprocket chains for every type of use—as well as a line of special chains. Write on the types that interest you.

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diamond dust. This hardness property has led to the substitution of boron carbide lapping powder for diamond dust in various commercial operations.

Because large crystal and molten aggregates of crystals can be isolated, the mechanical strength of the products can be determined. In Table III a series of comparative values for resistance to compression is given for a number of related crystalline materials. The tests were made by lapping out small cubes from the crystalline product, taking care to select dense specimens free from flaws and cleavages. Specimens were in the form of equidimensional cubes with an average length of side of about 0.3 inch.

Table IV

Boron Carbide versus Other Hard Carbides

Material Tested	Modulus of Rupture in Compression lbs./sq. in.	kg./cm.²
Molded B_4C	260,000	18,000
Tungsten carbide alloy	520,000	36,000
Tantalum carbide alloy	267,000	19,000

The new product is distinctly stronger than the other crystalline materials which are listed for comparison in this test. A comparison was then made with the semimetallic hard alloys which have recently appeared on the market. The specimens were similar to those described above and were tested in the same manner for their modulus of rupture in compression with the results shown in Table IV. These data were made up from single determinations and no large quantity of product was tested.

For further comparison, tests were made of the modulus of rupture in cross-bending shown by typical hard, metallic alloy products. The results are given in Table V.

A review of the data in Tables III, IV and V indicates that the strength of the new product greatly exceeds the strength of similar abrasive and crystalline materials. The new boron carbide, however, is not as strong either in compression or cross-bending as cemented tungsten carbide. This limits its use to mechanical fields similar to those occupied by the diamond because of its inherent brittleness.

As far as we have determined, the boron carbide made by us does not have an appreciable vapor pressure at its melting point as does silicon carbide. Because of the difficulty of measurement at high temperatures, the melting point is known only approximately.

As a matter of interest, the first high purity sample isolated, free of graphite and any significant amount of contaminating metal carbides or borides, had the composition reported in Table VI.

The industrial applications for boron carbide depend entirely on its unique property of hardness. The margin of superior intrinsic hardness over silicon carbide has led to its use in operations which have been difficult with the standard abrasives, fused alumina and silicon carbide. Because it approaches the diamond in hardness, it has been used to supplant diamond powders for certain industrial applications. Specifically, the drilling of tungsten alloy die nibs has been an operation which has been conducted by means of silicon carbide and diamond dust. The entire operation is now conducted in many die shops with the sole use of sized lapping powders of B_4C prepared by us.

It has also been applied to the finishing of various types of tungsten carbide alloy tools for the same reason. The rate of cutting and the economy of material used has indicated that a very definite field will be found for the new product.

Table V

Cross Bending

Material Tested	Modulus of Rupture in Cross-bending lbs./sq. in.	kg./cm.²
Tungsten carbide alloy	250,000	17,600
Molded B_4C	44,000	3,100
Crystalline alumina	14,000	990

The boron carbide abrasive grain has been applied to the other forms usual to abrasive products. The general use of such products as boron carbide grinding wheels, abrasive papers, and the like, will depend entirely on economic considerations since the product is necessarily more expensive than silicon carbide.

Because it can be melted to a liquid phase it can be used for self-bonded articles of great hardness, notably pressure blast nozzles.

In the field of abrasive blasting with compressed air, the nozzle wear for all of the usual type of material is so rapid that the cost of nozzles is an important item in the operation. Also, because ordinary nozzles are cut out so rapidly by the abrasive stream, the efficiency of blasting falls greatly, and large volumes of air must be pumped to maintain the velocity of the stream at the end of the nozzle life period. It has been only in recent years that long life nozzles have appeared in the industry. Extended service tests indicate that the boron carbide product is superior to any long life nozzle which has yet appeared on the market. A molded article with such high intrinsic hardness without any bonding material of lesser degree of hardness is an absolute novelty for the use. Commercial nozzles now are being manufactured by us from this boron carbide. A wide range of sizes can be manufactured.

There is much promise in the experimental application of the molded product to jewel-type bearings, and other special small bearings where the combination of properties of the new material is of value. The significant properties are the hardness, the monocrystalline structure, and the freedom from pores. In this latter respect the product is superior to many synthetic gems. The self-bonded nature of the molded crystalline material makes a wearing surface which remains polished with high luster during use, and which does not tend to abrade the pivots or journals.

The new product has been made into wire drawing dies. In this field it offers a possible substitute for the diamond die. But this development is still in the experimental stage. In many fields where intrinsic hardness is the essential property of a wearing surface boron carbide inserts, guides, tubes, and the like, have found commercial acceptance. It is thought that the publication of the information in regard to the properties of the material in this report will suggest to research men and designing engineers new applications for it.

Table VI

Complete Analysis of New Boron Carbide

Constituent	Sample D-258	Theoretical B_4C	Theoretical B_6C
Total boron	78.22%	77.3%	83.8%
Si	0.01	.....	.....
Fe	0.14	.....	.....
Total carbon	21.0	21.5	15.5
Undetermined	0.63	.....	.....

Because of the high boron content of the carbide and its state of reduction, it has been suggested as a source of boron for alloys in metallurgical uses. The purity of the product described exceeds in quality the usual material used for boron additions. Such a suggested use may be limited by the high melting point and chemical stability of the compound. The accompanying carbon may be objectionable in certain cases.

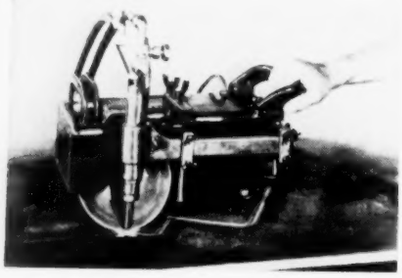
NEW EQUIPMENT

PRODUCTION FABRICATION
TREATMENT FINISHING

Oxyacetylene Cutting Unit—Air Reduction Sales Co., Lincoln building, New York, recently added an "Airco-DB Tractograph" to its line of oxyacetylene cutting machines. The unit, shown herewith, provides a simple means for accurately cutting steel plates and slabs into shapes having straight, circular or irregular outlines and extending over practically unlimited areas. It is intended for the cutting of plates and slabs up to 2 inches in thickness.

The machine is a small, compact, motor propelled unit which can be quickly adjusted to travel at any speed from 2½ inches per minute. As it travels it is guided by hand along the desired contour laid out and scribed directly on the plate or slab. An entirely new principle in cutting machine drive, combined with other features which enable the operator to change the direction of the machine with exceptional ease, make it possible to turn sharp corners and follow both simple and intricate contours with unusual accuracy.

The "Tractograph" will cut beveled as well as perpendicular edges. With the radius rod in place it will automatically cut arcs or complete circles. Circles or arcs of smaller radius than the minimum possible



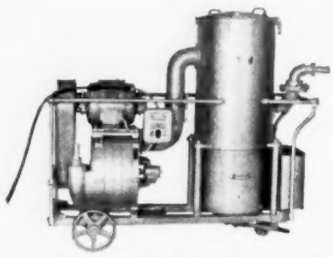
"Airco-DB Tractograph" for cutting steel plates into shapes

with the radius rod, can be cut with manual guidance. Also, it is capable of traveling up an incline of approximately 10 degrees on ordinary hot rolled steel plate without slipping.

Once the operator has set the travel speed, lit the torch and pressed the starting switch, he can confine his attention to guiding the machine. In addition to being held always in correct position relative to the plate, it is automatically moved along at a uniform speed throughout the extent of the cut. The experienced operator can make cuts with the "Tractograph" that are practically as smooth as those produced by a completely automatic gas cutting machine, it is claimed. Measuring only 7¼ x 8¼ x 16 inches, and weighing but 48 pounds, the unit can be easily carried about and used wherever 110 volts, alternating current or direct current is available.

♦ ♦ ♦

Industrial Cleaning Unit—Invincible Vacuum Cleaner Mfg. Co., Dover, O., recently added to its line of portable industrial cleaning equipment a new model known as an industrial



Industrial cleaning machine developed by Invincible Vacuum Cleaner Mfg. Co.

master truck, shown in the accompanying illustration. The unit is powered by a 5 horespower motor. A specially designed 4-stage turbine, driven by a 3-groove Texrope drive produces 72 inches of vacuum and handles 265 cubic feet of air per minute. Compactness is indicated by these over-all dimensions, height 57 inches, width 21 inches, length 67 inches.

A separator removes all dirt, litter and abrasive material from the air before it passes through the mechanical parts. Dirt is collected in a foot lever-operated metal container close to the floor. The machine may be operated with two sets of cleaning tools.

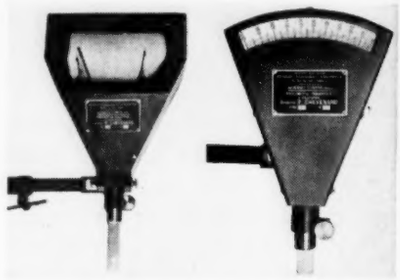
♦ ♦ ♦

Portable Grinder—Chicago Wheel & Mfg. Co., Chicago, is announcing a new portable electric grinder of the universal type which has a built-in air filter, effectively filtering all air entering the motor. This new tool, shown herewith, weighs four pounds, turns up 17,000 revolutions per minute, and has ample power to pull a wheel 2 inches in diameter. Motor housing of heavy cast aluminum extends out over the motor shaft and air filter, and is encased with an insulating cushion grip, giving positive control and operating flexibility. It is compact, well balanced, and, with suitable grinding wheel or cutter inserted in the universal case hardened chuck, will work at any angle and get into and around corners, irregular shaped holes and other hard to reach places.

The filter is of the viscous type and can be removed easily for cleaning and re-oiling. Tests running over a period of a year in various shops have proved the air filter a most efficient protection for keeping all dust and abrasive matter out of the motor and bearings, it is claimed. Ventilation is in no way impaired even when the filter becomes extremely loaded with foreign matter.

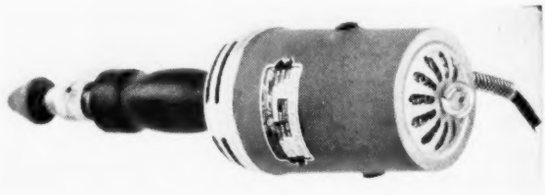
♦ ♦ ♦

Industrial Pyrometers — R. Y. Ferner Co., Investment building, Washington, as American agents for the Acieries d'Imphy, is placing on the market a line of industrial pyrometers designed by Dr. Chevenard. These units make use of the difference of expansion of a rod of Pyros and the fused silica tube in which the Pyros rod is contained. Pyros is an alloy developed to withstand repeated cycles of heating to 1100 degrees Cent. (2000 degrees Fahr.) and cooling without changing its characteristics or showing appreciable oxidation.



Two types of industrial pyrometers marketed by R. Y. Ferner Co.

Instruments are supplied in five types, and in three ranges of temperature—up to 300, 600 and 1000 degrees Cent. Type A and B, shown above, are dial instruments, type

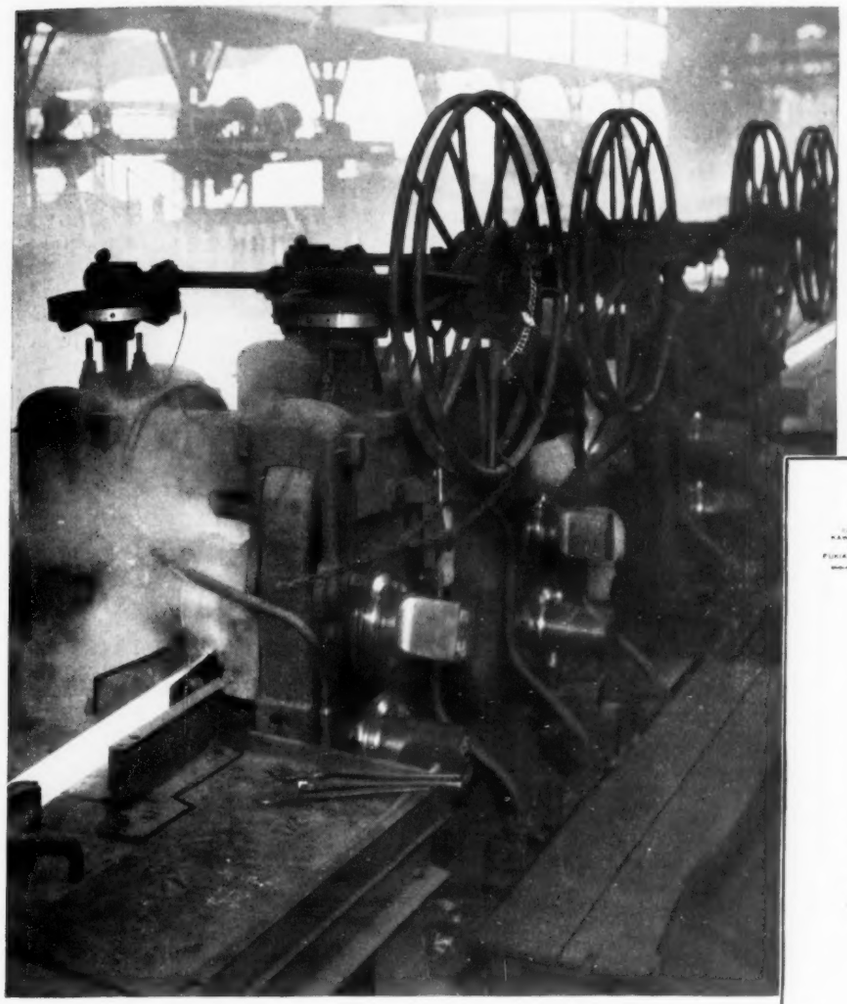


Portable electric grinder built by Chicago Wheel & Mfg. Co. has built-in air filter

425,228 Tons, 13,160 Hours, *3 Years

of CONTINUOUS SERVICE *Without* BEARING FAILURE

*Taken out of service June 28, 1934 for exhibition purposes



Continuous Hot Strip Finishing Mill of four 18"—2 High stands in operation at Kawasaki Dockyard Co., Ltd.

ROLLING

8" x 1/4" STRIP

***Here's the* PROOF**

KAWASAKI DOCKYARD CO., LTD.,

PLATE & SHEET MILLS.

WAKINOHAMA, SCHOME.

FUKIAI.

KOBE, JAPAN, July 12th, 1934.

Messrs. SKF Industries of Japan,
Tokyo.

CERTIFICATE

We are hereby pleased to certify that bearings of type 1.28818 were mounted in the No. 4 Stand of the Finishing Train of our Sheet Bar Rolling Mill on June 8, 1931. The two bearings of type 1.28818 which we sent to you at your request at the end of June this year have been used continuously in the No. 4 Stand from the time the stand was first equipped with SKF Bearings up to June 23 this year.

During that period the bearings have been working for 13,160 hours and 425,228 tons have been rolled.

It is a pleasure for us to confirm that we have found the SKF Self-aligning Roller Bearing eminently suitable for rolling mill service and this is borne out by the fact that all 4 stands in the finishing train now are equipped with SKF Bearings throughout. We are also specifying SKF Bearings for rolling mill service when it is the question about new purchases.

Director and General Manager.

HERE'S A JOB that speaks for itself . . . for SKF Self-Aligning Roll Neck Bearings that have stood up for 32,864,171 rev. under load in a finishing stand of a continuous 18"—2 high sheet bar rolling mill! Here's a job for bearings that take their punishment . . . and LIKE it . . . and never ask for anything but grease! In all the time they've been on the job, they've never needed adjustments . . . never demanded repairs! They would have been good bearings if they had failed long ago! Yet the plus-performance qualities built into them allow them to go on and on!

It is well to remember that big tonnage figures mean little unless revolutions per ton rolled material are known. The big swing towards SKF . . . 1041 stands . . . more than twice as many as any other bearing . . . is due to the fact that SKF Bearings are built for performance. No one knows what old age for SKF Bearings really is! It is significant that some of the first SKF Bearings installed 27 years ago in industrial machinery . . . are still in service!

SKF INDUSTRIES, INC.
Front Street & Erie Avenue Philadelphia, Pa.

3304

SKF

SELF-ALIGNING

ROLL NECK BEARINGS

provide an equalized load distribution insuring the full bearing capacity and the longest life.

A being merely an indicating instrument while type B not only indicates the temperatures by a pointer moving over a scale but also has two arms pivoted in the same axis as the pointer. One of these is set at the desired temperature and as the temperature of the furnace increases the pointer approaches and makes electrical contact with it to operate a relay and open a mercury switch, cutting off the heating current. Or the relay may be designed to partially close a gas or oil line. When the contact between the arm and pointer is broken, the relay operates to turn on the heat again.

The pointer is fitted with two contact points, the second of which will act soon after the first, if the first fails to break the heating circuit. If, after the contact between the pointer and arm is broken, the heat should not be turned on for some reason, the pointer continues to move towards lower temperatures on the scale until it comes in contact with

Portable blower introduced by Ideal Commutator Dresser Co.

the other arm, set at whatever temperature is desirable, and through it gives an alarm either by bell or flashing of a light, to warn that the heat has not been turned on as it should.

The other three types are fitted with a revolving drum driven by clockwork, on which in type C the temperature is merely recorded. In type E the temperature is similarly recorded but the instrument is also equipped with two arms like type B by which the temperature can be held at a certain limit, with the giving of an alarm if it falls too low. With the third one, type F, a desired cycle of temperature can be imposed on the furnace or bath which is being controlled.

♦ ♦ ♦

Portable Blower—Ideal Commutator Dresser Co., Sycamore, Ill., recently added a new portable blower, shown above, to its line. The unit has three distinct uses; it blows, suctions and sprays. It has a water column lift of 46.25 inches and a 2½-inch fan.

The 275 mile-per-hour blast of clean, dry air blows or vacuums all the dirt from motors, machinery, nooks, corners, etc. It cleans irregular surfaces before painting. The sprayer attachment sprays paint, varnish, duco, oil, insecticides, or in fact any liquid or powder. The cleaner has a wide variety of uses in the plant, warehouse, mill or office.

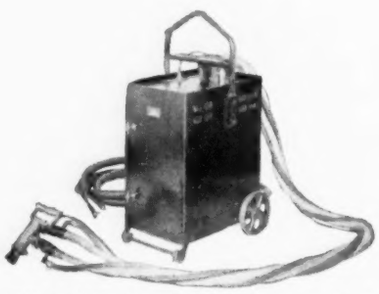
♦ ♦ ♦

Electric Stud Welder — General Electric Co., Schenectady, N. Y., recently introduced a portable stud welder consisting as shown herewith, of a welding transformer and control mounted in a portable steel cabinet, primary and secondary cable, and a stud-welding gun. The stud welder is an equipment for fusing the end of a stud into a metal surface—applications include welding studs to steel surfaces for hanging piping, conduits, instruments, hooks, and insulating materials.

A stud is placed in the welding gun, pressed against the surface to which it is to be welded, and one automatically timed impulse of power completes the weld. One side of the portable steel cabinet is equipped with split steel doors which give access to the control panel. Opening the upper door automatically removes power from the panel; adjustment of current and time for different sizes of studs are made with this upper door open. The lower door is used for servicing and normally can be kept locked.

The welding gun is a tool for holding the stud against the work under spring pressure, and for properly directing the welding current. The gun is light in weight—most parts being of aluminum—and will accommodate studs of from ⅛ to 5/16 of an inch in diameter and from ½ to 2½ inches long. A control switch in the spade-type handle of the gun controls the operation of an automatic timer located on the control panel.

The timer is adjustable for periods of from 1/12 to 5/6 of a second, the exact time used depending on the size of stud being applied. Once adjusted, the timer repeats the desired

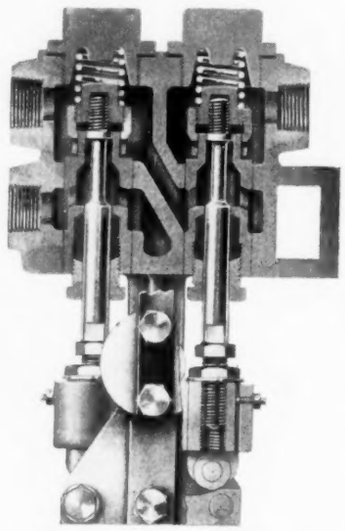


GE welder for fusing the end of a stud into a metal surface

duration of current flow for each weld. The new stud welder is obtainable for single-phase power supplies of from 25 to 60 cycles, 110 to 550 volts.

♦ ♦ ♦

Hydraulic Operating Valve—Homestead Valve Mfg. Co., Coraopolis, Pa., recently introduced a hydraulic operating valve which utilizes the protected seat principle. By employing a closely fitted sleeve around the seat and a close-fitting plunger inside the neck of the seat or seat bushing, it has been possible in a newly designed hydraulic operating valve unit to cut off practically all flow of water as the valve stem moves



Homestead hydraulic operating valve has protected seat

downward with the closing of the device. Seating elements therefore, make contact with practically no water flowing, with the result that wire drawing or cutting of the seating elements is prevented. The ring of water between the two parts of the seating mechanism, formed prior to the closing of the valve, aids in cushioning the closing and prevents hammering of the disk under action of high pressure water.

Sectional view of a three-way valve, depicted herewith, shows both inlet (right side) and cylinder (upper port on left side) valves in closed position, operating handle being vertical. If the operating lever is moved to the left the inlet opens and water passes to the cylinder. If moved to the right the exhaust valve opens and water passes from the cylinder down through the exhaust valve (lower port on left-hand side) and out through the exhaust line.

Steel Rate Up to 25; Industry More Confident

Larger Demands Accumulating in Some Major Consuming Groups for Early Action —Miscellaneous Buying Broadens — Scrap Firmer — Price Control in Balance

AFTER three months of the worst drouth in their business since the bank-holiday period last year, steelmakers enter the fourth quarter moderately encouraged by the outlook for more action in the markets.

Contributing to this feeling is the further rise of 2½ points to 25 per cent in steelworks operations last week, responding to a more varied and seasonal buying; prospects for extensive purchasing by the automobile industry this month; acceleration in large public construction projects, and a firmer tone in scrap prices. Settlement of the textile strike also is a factor, this industry being an important consumer of cold-drawn steel.

In the major consuming classifications, only one—the railroads—fails to offer some hope of better buying over the remainder of the year. Agricultural demand is on the upgrade, equipment manufacturers purchasing considerable quantities. The retail market for automobiles continues fairly strong, with production of present models easing off gradually, and a little more demand for steel in preparation for new models.

Ford Anticipating Inflation? Test on Price Control Feature of Codes Believed Near

Thus far, only in isolated instances have consumers hedged against the possibility of inflation, by contracting for the full fourth quarter. Expectations of inflation are not yet sufficiently strong and general to overcome the recent display of uncertainty in respect to prices. The trade, however, is wondering whether Ford's production and accumulation of $5,000,000 to $6,000,000 worth of steel has an inflationary aspect.

Furthermore, it is believed one of the basic features in the steel code is nearing a crucial test, with Donald R. Richberg, the new NRA chief, unequivocally opposed to price control, and apparently favoring limiting codes to trade practices, wages and hours.

Currently, the most active single feature in steel demand is represented by large public works construction projects, many of which are soon coming to actual purchase. These are especially notable in the Middle West, where bids are being taken on 18,000 tons of reinforcing bars for the Fort Peck, Montana, dam, and 23,000 tons of shapes and bars for Missouri highways and bridges. The first of the 12 reservoirs for the Muskingum, Ohio, flood control will be figured this week, the entire project requiring more than 10,000 tons of steel. Structural shape awards last week totaled 14,044 tons, compared with 20,028 tons in the preceding week.

Navy and Oil-Tank Requirements Figured; Storage Rates on Imported Pig Iron Cut

The navy will open bids about Oct. 15 on 3540 tons of plates and sheets. Tank work is more active in the East, with awards last week and ten new projects up for figures involving a total of 6800 tons of plates. Mexican National Railways are in the market for 1000 box cars. Chesapeake & Ohio is to close this week on 250 tons of track accessories.

Scrap prices developed strength at Pittsburgh and Chicago. A detinning company in the Pittsburgh district sold 10,000 tons of scrap to an eastern Pennsylvania steelworks. At Chicago heavy melting steel advanced 50 cents, on brokers' purchases to cover commitments, and more active demand from foundries.

Storage rates on foreign pig iron at Boston have been reduced, leading to some fears of larger importations. Connellsville foundry and coke prices have been extended for fourth quarter.

For the first time in months no district recorded a loss in steelworks operations last week. Chicago was up 4 to 26 per cent; Wheeling 5 to 31; Youngstown 2 to 28; New England 3 to 31; Pittsburgh 1 to 17. Detroit held at 77; eastern Pennsylvania 17; Cleveland 28; and Birmingham 25. For the third quarter, steelworks operations averaged 23.7 per cent; compared with 50.9 in the second quarter; and 49.1 in the third quarter last year.

Iron and steel exports in August totaled 242,947 tons, up from 238,186 tons in July, and comparing with 119,374 tons in August, 1933.

STEEL's iron and steel price composite is unchanged at $32.13; the finished steel composite remains $54, while the scrap index is up 9 cents to $9.42.

COMPOSITE MARKET AVERAGES

	Sept. 29	Sept. 22	One Month Ago Aug., 1934	Three Months Ago June, 1934	One Year Ago Sept., 1933	Five Years Ago Sept., 1929
Iron and Steel Composite	$32.13	$32.13	$32.24	$32.96	$30.36	$36.20
Finished Steel Composite	54.00	54.00	54.00	55.08	48.52	57.43
Steelworks Scrap Composite	9.42	9.33	9.98	10.32	10.83	16.39

Iron and Steel Composite:—Pig iron, scrap, billets, sheet bars, wire rods, tin plate, wire, sheets, plates, shapes, bars, black pipe, rails, alloy steel, hot strip and cast iron pipe. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

A COMPARISON OF PRICES

Representative Market Figures for Current Week; Average forLast Month, Three Months and One Year Ago

	Sept. 29, 1934	Aug. 1934	June 1934	Sept. 1933
Finished Material				
Steel bars, Pittsburgh	1.80	1.80	1.90	1.60
Steel bars, Chicago	1.85	1.85	1.95	1.70
Steel bars, Philadelphia	2.09	2.09	2.09	1.91
Iron bars, Terre Haute, Ind.	1.75	1.75	1.85	1.60
Shapes, Pittsburgh	1.80	1.80	1.85	1.60
Shapes, Philadelphia	2.00½	2.00½	2.00½	1.90½
Shapes, Chicago	1.85	1.85	1.90	1.65
Tank plates, Pittsburgh	1.80	1.80	1.85	1.60
Tank plates, Philadelphia	1.98½	1.98½	1.98½	1.88½
Tank plates, Chicago	1.85	1.85	1.90	1.65
Sheets, No. 10, hot rolled, Pitts.	1.85	1.85	2.00	1.70
Sheets, No. 24, hot ann., Pitts.	2.40	2.40	2.65	2.25
Sheets, No. 24, galvan., Pitts.	3.10	3.10	3.25	2.85
Sheets, No. 10, hot rolled, Gary	1.95	1.95	2.10	1.75
Sheets, No. 24, hot anneal., Gary	2.55	2.55	2.75	2.35
Sheets, No. 24, galvan., Gary	3.20	3.20	3.35	2.95
Plain wire, Pittsburgh	2.30	2.30	2.30	2.10
Tin plate, per base box, Pitts.	5.25	5.25	5.25	4.65
Wire nails, Pittsburgh	2.60	2.60	2.60	2.10
Semifinished Material				
Sheet bars, open-hearth, Youngs.	$28.00	$28.00	$30.00	$26.00
Sheet bars, open-hearth, Pitts.	28.00	28.00	30.00	26.00
Billets, open-hearth, Pittsburgh	27.00	27.00	29.00	26.00
Wire rods, Pittsburgh	38.00	38.00	38.00	35.00

	Sept. 29, 1934	Aug. 1934	June 1934	Sept. 1933
Pig Iron				
Bessemer, del. Pittsburgh	19.76	$19.76	$19.76	$19.26
Basic, Valley	18.00	18.00	18.00	17.00
Basic, eastern, del. eastern Pa.	19.76	19.76	19.76	17.76
No. 2 foundry, del. Pittsburgh	19.26	19.26	19.26	18.76
No. 2 foundry, Chicago	18.50	18.50	18.50	17.50
Southern, No. 2, Birmingham	14.50	14.50	14.50	.....
No. 2X, Eastern del. Philadelphia	20.63	20.63	20.63	18.63
Malleable, Valley	18.50	18.50	18.50	17.50
Malleable, Chicago	18.50	18.50	18.50	17.50
Lake Superior charcoal, del. Chi.	23.54	23.54	23.54	23.54
Gray forge, del. Pittsburgh	18.88	18.88	18.88	18.26
Ferromanganese, del. Pittsburgh	89.79	89.79	90.00	87.24
Scrap				
Heavy melting steel, Pittsburgh	$10.75	11.45	11.90	13.00
Heavy melt. steel, No. 2, east. Pa.	8.00	8.40	8.85	9.90
Heavy melting steel, Chicago	8.75	9.25	9.75	9.95
Rails for rolling, Chicago	9.75	10.50	11.25	11.25
Railroad steel specialties, Chicago	9.50	10.25	11.25	10.75
Coke				
Connellsville, furnace, ovens	3.60	3.60	3.60	2.50
Connellsville, foundry, ovens	4.60	4.60	4.60	3.15
Chicago, by-product foundry, del.	9.25	9.25	9.25	8.75

Steel, Iron, Raw Material and Metals Prices

Prices conform to American Iron and Steel institute schedules. Asterisk denotes price change this week

Sheet Steel

HOT ROLLED No. 10
(24 to 48 inches wide)

Pittsburgh, base	1.85c
Gary, base	1.95c
Chicago, del.	1.98c
New York, del.	2.18c
Philadelphia, del.	2.14c
Birmingham, base	2.00c
St. Louis, del.	2.17c
F.o.b. cars, dock, Pacific ports	2.40c

HOT ROLLED ANN. No. 24

Pittsburgh, base	2.40c
Gary, base	2.50c
Chicago, del.	2.53c
Detroit, del.	2.60c
New York, del.	2.73c
Philadelphia, del.	2.69c
Birmingham, base	2.55c
St. Louis, del.	2.72c
F.o.b. cars, dock, Pacific ports	3.05c

GALVANIZED No. 24

Pittsburgh, base	3.10c
Gary, base	3.20c
Chicago, del.	3.23c
Philadelphia, del.	3.39c
New York, del.	3.43c
Birmingham, base	3.25c
St. Louis, del.	3.42c
San Francisco, f.o.b. cars, dock	3.70c

TIN MILL BLACK No. 28

Pittsburgh, base	2.75c
Gary, base	2.85c
St. Louis, del.	3.07c

COLD ROLLED No. 10

Pittsburgh, base	2.50c
Gary, base	2.60c
Detroit, delivered	2.70c
Philadelphia, del.	2.79c
New York, del.	2.83c
F.o.b. cars, dock, Pacific ports	3.10c

COLD ROLLED No. 20

Pittsburgh, base	2.95c
Gary, base	3.05c
Detroit, delivered	3.15c
Philadelphia, del.	3.24c
New York, del.	3.28c

ENAMELING SHEETS

Pittsburgh, No. 10	2.50c
Pittsburgh, No. 20	3.10c

Tin and Terne Plate

Per 100-lb. box, Pittsburgh. Gary base, 10 cents higher.

Tin plate, coke base contract	$5.25
Do., stock	$4.90
Long ternes, No. 24 unassorted	3.40c

Corrosion and Heat Resistant Alloys

Base, Pittsburgh

18% chrome, 8% nickel; sheets 35c; plates, 28c; bars, 24c; hot-rolled strip, 24.50c; cold-rolled strip, 32.00c

	A	B	C	D
Bars	17c	18.5c	21c	26c
Plates	20c	21.5c	24c	29c
Sheets	25c	28c	31c	35c
Hot strip	17c	18.5c	21c	26c
Cold strip	22.5c	24c	27c	35c

Carbon 0.12 and under; no nickel. A has chrome 15% and under. B over 15/18% inc., C over 19/23% inc., D over 23/30%.

Steel Plates

Pittsburgh, base	1.80c
New York, del.	2.08c
Philadelphia, del.	1.98½c
Boston, del.	2.20c
Buffalo, del.	2.03½c
Chicago or Gary base	1.85c
Cleveland, del.	1.98½c
Birmingham, base	1.85c
Coatesville, base	1.90c
Sparrows Pt., base	1.90c
Pacific Coast, f.o.b. cars, dock	2.35c
St. Louis, del.	2.07c

Structural Shapes

Pittsburgh, base	1.80c
Philadelphia, del.	2.00½c
New York, del.	2.05¼c
Boston, del.	2.18½c
Bethlehem, base	1.90c
Chicago, base	1.85c
Cleveland, del.	1.98½c
Buffalo, base	1.90c
Gulf ports	2.20c
Birmingham, base	1.95c
Pacific Coast, f.o.b. cars, dock	2.35c

Bars

SOFT STEEL

Pittsburgh, base	1.80c
Chicago or Gary	1.85c
Duluth, base	1.95c
Birmingham, base	1.95c
Cleveland, base	1.85c
Buffalo	1.90c
Detroit, del.	1.95c
Pacific Coast ports cars, dock, c.i.f.	2.35c
Philadelphia, del.	2.09c
Boston, del.	2.20c
New York, del.	2.13c
Pitts., forg. qual.	1.95c-2.05c

RAIL STEEL
To Manufacturing Trade

Pittsburgh, base	1.70c
Chicago or Gary, base	1.75c
Moline, Ill., base	1.75c
Cleveland, base	1.75c
Buffalo, base	1.80c

IRON

Terre Haute, Ind.	1.75c
Chicago	1.80c
Philadelphia, base	1.89c
Pittsburgh, refined	2.75c-7.50c

REINFORCING

New billet, cut lengths, carlots

Pittsburgh	2.05c
Chicago, Gary, Buffalo Cleve., Birm., Young	2.10c
Gulf ports	2.45c
Pacific coast ports f.o.b. cars dock	2.45c
Philadelphia, del.	2.34c

Rail Steel

Pittsburgh, base	1.90c
Chicago, Buffalo, Cleveland, Birm., Young	1.95c
Gulf ports	2.30c

Wire Products □ □

(Prices apply to straight or mixed carloads; pool cars, or less, 10c up. 10% dis. on nail extras on straight or mixed carloads to one consignee.)

Base, Pittsburgh-Cleveland (Per 100-lb. keg)

Standard wire nails	$2.60
Cement coated nails	2.60
Galvanized nails, 15 gage and coarser	4.60c
Do., 16 gage and finer	5 10c

(Per pound)

Polished staples	3.30c
Galvanized fence staples	3.55c
Barbed wire, galv.	3.00c
Annealed fence wire	2.45c
Galvanized fence wire	2.80c
Woven wire fencing (base column, c.l.)	$63.00
Plain wire, 6-9 gage to mfg. trade	2.30c

Anderson, Ind., (merchant products only) and Chicago up $1; Duluth up $2; Birmingham up $3.

Spring wire	3.20c

Chicago $1 higher, Worcester $2 higher.

Cold-Finished Carbon Bars and Shafting □ □

Base Pitts., one size, shape, grade, shipment at one time to one destination

10,000 to 19,999 lbs	2.10c
20,000 to 59,999 lbs.	2.05c
60,000 to 99,999 lbs.	2.00c
100,000 lbs. and over	1.97½c

Gary, Ind., Cleveland, up 5c; Buffalo, up 10c; Detroit, up 20c; eastern Michigan, up 25c.

Alloy Steel Bars □

Hot Rolled

Pittsburgh, Buffalo, Chicago, Massillon, Canton, Bethlehem 2.45c

S.A.E.	Alloy Diff.	S.A.E.	Alloy Diff.
2000	0.25	3100	0.55
2100	0.55	3200	1.35
2300	1.50	3300	3.80
2500	2.25	3400	3.20
4100	.15 to .25	Mo.	0.50
4600	.20 to .30	Mo. 125-1.75 Ni.	1.05
5100	.80-1.10 Cr.		0.45
5100 Cr. spring			base
6100 bars			1.20
6100 spring			0.70
Cr., Ni., Van.			1.50
Carbon van.			0.95
9250	Carbon base plus extras		

Strip and Hoops □

Hot strip to 23⅞-in. Pittsburgh	1.85c
Chicago, base	1.95c
Birmingham, base	2.00c
Detroit, delivered	2.05c
Phila., delivered	2.14c
New York, del	2.18c
Cooperage hoop, Pittsburgh	1.95c
Chicago	2.05c
Cold-rolled strip, Pitts., Cleve	2.60c
Worcester, Mass.	2.80c

Rails, Track Material □

(Gross Tons)

Standard rails, mill	$36.37½
Relay rails, Pitts. 24-45 lbs.	$27.00
50-60 lbs.	$24.00
70-75 lbs.	$18.00
80-85 lbs.	$25.00
100 lbs.	$26.00
Light rails, billet qual., Pittsb., Chi.	$35.00
Do., reroll. qual.	$34.00
Angle bars, mills	2.55c
Spikes, R. R. base	2.40c
Track bolts, base	3.55c
Tie plates, base	1.90c

Base, light rails 25 to 40 lbs.; 50 to 60 lbs. inclusive up $5; 16 and 20 lbs., up $1; 12 lbs., up $8; 8 and 10 lbs., up $5. Base railroad spikes 200 kegs or more; base tie plates 20 tons.

Bolts and Nuts □ □

Pittsburgh, Cleveland, Birmingham, Chicago. Discounts to legitimate trade for all case lots. Dec. 1, 1932, lists.

CARRIAGE BOLTS

*All sizes, cut thrd	70-10-10 off
*Rolled thread, ½ x 6 and smaller	70-10-10 off

MACHINE BOLTS

*All sizes, cut thread, lag screws, plow bolts, Nos. 1-2-3-7 heads, tap bolts, blank bolts, stud bolts, without nuts	70-10-10 off
*Tire bolts	70-10 off

Stove bolts, 75 off in pkgs.; 83 off in bulk, 15,000 or more of a size.

*Rolled thread machine bolts, ½ x 6 and smaller	70-10-10 off
*Step bolts	70-10 off
*Elevator bolts	70-10 off

NUTS

*S.A.E. semifinished hexagon: ½ to ⅞-inch	75-10 off
* Do., ½ to 1-inch	75 off
* Do., over 1-inch	70 off

HEXAGON CAP SCREWS

Milled	80-10-10 off
Upset 1-in., smaller	85 off

SQUARE HEAD SET SCREWS

Upset, 1-in., smaller	75-10 off
Do., larger than 1-in.	75-10 off
Headless set screws	75 off

Rivets, Wrought Washers

Struc., c. l., Pittsburgh, Cleveland	2.90c
Struc., c. l., Chicago	3.00c
⅞-in. and smaller, Pitts., Chi., Cleve.	70 and 5 off
Wrought washers, Pitts., Chi., Phila.	6.00 off

Cut Nails □ □

Cut nails, Pitts.; (10% discount on size extras)	$2.75
Do. less carloads, 5 kegs or more no discount on size extras	$3.05
Do. less than 5 kegs; no discount on size extras	$3.20

Pipe and Tubing

Base $200 net ton, except on standard commercial seamless boiler tubes under 2 inches and cold drawn seamless tubing.

Welded Iron, Steel Pipe

Base discounts on steel pipe, Pitts., Lorain, O., to consumers in carloads, Gary, Ind., 2 points less. Chicago delivered 2½ points less. Wrought pipe, Pittsburgh base.

BUTT WELD

Steel

In.	Blk.	Gal.
¼ and ⅜	53½	35
½	58½	47
¾	62	52
1—3	64	55

Iron

½	31½	15
¾	36½	20½
1—1¼	39½	26½
2	41½	26

LAP WELD

Steel

2	60	51
2½—3	63	54
3½—6	65	56
7 and 8	64	54
9 and 10	63½	53½

Iron

2	37	22½
2½—3½	38	25
4—8	40	28½

LINE PIPE

Steel

⅛, butt weld	57½
⅛-inch, but weld	50½
¼—⅜, buttweld	52½
¾, butt weld	61
1—3, butt weld	63
2-inch, lap weld	59
2½—3, lap weld	62
3½—6, lap weld	64
7—8, lap weld	63

Iron

⅛—1½-inch, black and galv. take 4 pts., over; 2½—6-inch 2 pts. over discounts for same sizes, standard pipe lists. 8—12-inch, no extra.

BOILER TUBES

C. L. Discounts, f.o.b. Pitts.

Lap Weld Steel		*Charcoal Iron*	
2—2¼	33	1¾	8
2½—2¾	40	2—2¼	13
3	47	2½—2¾	16
3¼—3½	50	3	17
4	52	3¾—3½	18
4½—5	42	4	20
		4½	21

In lots of a carload or more, above discounts subject to preferential of two 5% and one 7½% discount on steel and 10% on charcoal iron.

Lapwelded steel: 2000 to 9999 pounds, ten points under base, one 5% and one 7½%. Under 2000 pounds 15 points under base, one 5% and one 7½%. Charcoal iron; 10,000 pounds to carloads, base less 5%; under 10,000 pounds, two points under base only.

SEAMLESS BOILER TUBES

Under date of May 15 in lots of 40,000 pounds or more for cold-drawn boiler tubes and in lots of 40,000 pounds or feet or more for hot-finished boiler tubes, revised prices are quoted for 55 cold-drawn boiler tube sizes ranging from ¼ to 6-inch outside diameter in 30 wall thicknesses, decimal equivalent from 0.035 to 1.000, on a dollars and cents basis per 100 feet and per pound.

Hot-finished carbon steel boiler tube prices also under date of May 15 range from 1 through 7 inches outside diameter, inclusive, and embrace 47 size classifications in 22 decimal wall thicknesses ranging from 0.109 to 1.000, prices also being on a lb. and 100 ft. basis.

Seamless Tubing □

Cold drawn; f.o.b. mill disc.

100 ft. or 150 lbs.	32%
15,000 ft. or 22,500 lbs.	70%

Cast Iron Water Pipe □

Class B Pipe—Per Net Ton

6-in. & over, Birm.	$38.00-39.00
4-in., Birmingham	41.00-42.00
4-in., Chicago	49.00-50.00
6 to 24-in., Chicago	46.00-47.00
3-in & over, east fdy	42.00
Do., 4-in.	45.00

Class A pipe $2 over Class B. Stnd. fitgs., Birm. base $100.00

Semifinished Steel □

BILLETS AND BLOOMS

4 x 4-inch base; gross ton

Pitts., Chi., Cleve., and Youngstown	$27.00
Philadelphia	32.30
Duluth	31.00
Forging, Pitts., Chi. and Buffalo	32.00
Forging, Duluth	36.00

SHEET BARS

Pitts., Cleve., Young., Chi., Buff., Canton, O., and Sparrows Point, Md.,	28.00

SLABS

Pitts., Cleve., Young.	27.00

WIRE RODS

Pitts., Cleveland	38.00
Chicago	39.00
Worcester, Mass.	40.00

SKELP

Pitts., Chicago	1.70c

Coke □ □ □

Price Per Net Ton

BEEHIVE OVENS

Connellsville Fur	$3.60- 3.85
Connellsville fdry	4.60
Connell. prem. fdy.	5.10- 5.35
New River fdry	6.00
Wise county fdry.	4.45- 5.25
Wise county fur	4.00- 4.50

BY-PRODUCT FOUNDRY

Newark, N. J., del.	8.71- 9.31
Chi., ov., outside del.	8.50
Chicago, del	9.25
New England, Del.	10.50
St. Louis, del.	9.25
Birmingham, ovens	6.00
Indianapolis, del.	8.75
Cincinnati, del.	9.30
Cleveland, del.	9.25
Buffalo, ovens	7.50- 8.00
Detroit, ovens	8.50
Philadelphia, del.	9.00

Coke By-Products □

Per gallon, producers' plants.

Tank lots

	Spot
Pure benzol	19.00c
90 per cent benzol	19.00c
Toluol	30.00c
Solvent naphtha	26.00c
Commercial xylol	26.00c

Per lb. f.o.b. New York

Phenol (200 lb drums)	16.30c
Do. (100 lbs.)	17.30c

Eastern Plants, per lb.

†Naphthalene flakes and balls, in bbl.	6.00c

Per 100 lb. Atlantic seaboard

Sulphate of ammonia	$1.20

†Western prices ½-cent up.

Pig Iron

Delivered prices do not include switching charges except as noted. No. 2 foundry iron is 1.75-2.25 silicon; 25-cent differentials apply for each 0.25 silicon above 2.25. Gross tons.

BASING POINTS:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	$19.50	$20.00	$19.00	$20.50
Birdsboro, Pa.	19.50	20.00	19.00	20.50
Birmingham, Ala., southern del.	14.50	.....	13.50	19.00
Buffalo	18.50	19.00	17.50	19.50
Chicago	18.50	18.50	18.00	19.00
Cleveland	18.50	18.50	18.00	19.00
Detroit	18.50	18.50	18.00	19.00
Duluth	19.00	19.00	.....	19.50
Erie, Pa.	18.50	19.00	18.00	19.50
Everett, Mass.	19.50	20.00	19.00	20.50
Granite City, Ill.	18.50	18.50	18.00	.....
Hamilton, O.	18.50	18.50	18.00	19.00
Jackson, O.	20.25	20.25	19.75	.....
Neville Island, Pa.	18.50	18.50	18.00	19.00
Provo, Utah	17.50	.....	17.00	.....
Sharpsville, Pa.	18.50	18.50	18.00	19.00
Sparrows Point, Md.	19.50	.....	19.00	.....
Swedeland, Pa.	19.50	20.00	19.00	20.50
Toledo, O.	18.50	18.50	18.00	19.00
Youngstown, O.	18.50	18.50	18.00	19.00
DELIVERED FROM BASING POINTS:				
Akron, O., from Cleveland	19.76	19.76	19.26	20.26
Baltimore from Birmingham	20.02	.....	19.90	.....
Boston from Birmingham	19.62	.....	19.50	.....
Boston from Everett, Mass.	20.00	20.50	19.50	21.00
Boston from Buffalo	20.00	20.50	19.50	21.00
Brooklyn, N. Y., from Bethlehem	21.77	22.27	.....	.....
Brooklyn, N. Y., from Bmghm.	21.39	.....	.....	.....
Canton, O., from Cleveland	19.76	19.76	19.26	20.26
Chicago from Birmingham	†18.72	.....	18.60	.....
Cincinnati from Hamilton, O.	19.51	19.51	19.01	.....
Cincinnati from Birmingham	19.13	.....	19.01	.....
Cleveland from Birmingham	18.62	.....	18.50	.....
Indianapolis from Hamilton, O.	20.77	20.77	20.27	21.27
Mansfield, O., from Toledo, O.	20.26	20.26	19.76	20.76
Milwaukee from Chicago	19.50	19.50	19.00	20.00
Muskegon, Mich., from Chicago, Toledo or Detroit	21.40	21.40	20.90	21.90
Newark, N. J., from Birmingham	20.51	.....	.....	.....
Newark, N. J., from Bethlehem	20.89	21.39	.....	.....
Philadelphia from Birmingham.	19.88	.....	19.76	.....
Philadelphia from Swedeland, Pa.	20.26	20.76	19.76	.....
Pittsburgh dist. from Neville Island	(Neville Island base, plus 63c, 76c and $1.13 switching chgs.)			
Saginaw, Mich., from Detroit	20.60	20.60	20.10	21.10
St. Louis from Granite City, Ill.	19.00	19.00	18.50	.....
St. Louis from Birmingham	18.62	.....	18.50	.....
St. Paul from Duluth	20.94	20.94	.....	21.44

†Over 0.70 phos.

LOW PHOS.

Basing Points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y.—$23.50. Basing Point: †Johnson City, Tenn.—$23.50

†Off grade material is $19.50

Philadelphia, standard and copper bearing 24.63

GRAY FORGE		CHARCOAL	
Valley furnace	18.25	Lake Superior fur.	21.00
Pitts. dist. fur.	18.25	Do., del. Chicago	24.04

SILVERY†

Jackson County, O., base; 6%—$22.75; 7—$23.75; 8—$24.75; 9—$25.75; 10—$26.75; 11—$27.75. Buffalo base prices $1.25 higher.

BESSEMER FERROSILICON†

Jackson County, O., base; 10%—$27.75; 11—$28.75; 12—$30.25; 13—$31.75; 14—$33.25; 15—$34.75; 16—$36.25. Buffalo base prices $1.25 higher.

†The lower all-rail delivered price from Jackson, O., or Buffalo is quoted with freight allowed.

Iron Ore

LAKE SUPERIOR ORE

Gross ton, 51½% Lower Lake Ports

Old range bessemer	$4.80
Mesabi nonbess.	4.50
High phosphorus	4.40
Mesabi bessemer	4.65
Old range nonbess.	4.65

EASTERN LOCAL ORES

Cents, unit, del. E. Pa.

Foundry and basic, 56-63% con. (nom.)	8.00- 9.00
Cop.-free low phos. 58-60% (nom.)	10.00-10.50

FOREIGN ORE

Cents per unit, f.a.s. Atlantic ports (nominal)

Foreign manganiferous ore, 45.55% iron, 6-10% man.	10.00
No. Afr. & low phos.	9.50
Swedish basic, 65%	9.00
Swedish low phos...	9.50
Spanish No. Africa basic, 50 to 60%..	9.00
Tungsten, spot, sh. ton unit, duty pd.	$17.75-18.25
N. F. fdy., 55%.....	7.00
Chrome ore, 48% gross ton, c.i.f.....	$18.00

Manganese Ore

(Nominal)

Prices, not including duty, cents per unit, cargo lots.

Caucasian, 52-55%..	26.00
So. African, 52%.....	26.00
So. Afr., 49-51%.....	24.00
Indian, 58-50%	nominal
Indian, 48-50%	nominal

Refractories

Per 1000 f.o.b. Works

FIRE CLAY BRICK

First Quality

Pa., Ill., Ky., Md., Ga., Mo.	$45.00
Alabama	45.00
Second Quality	
Pa., Ill., Ky., Md., Mo., Ga., Ala....	40.00
Ohio	
First quality	$40.00
Intermediary	36.00
Second quality	25.00

MALLEABLE BUNG BRICK

All bases	50.00

SILICA BRICK

Pennsylvania	$45.00
Joliet, E. Chicago....	54.00
Birmingham, Ala....	52.00

MAGNESITE

Imported dead-burned grains, net ton f.o.b. Chester, Pa., and Baltimore bases	$45.00
Domestic dead-burned grains, net ton f.o.b. Chester, Pa., and Baltimore bases	40.00
Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash.	22.00

BASIC BRICK

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Magnesite brick	$65.00
Chrome brick	45.00
Chemically bonded magnesite	55.00

Fluorspar, 85-5

Washed gravel, duty paid, tide, net ton	$19.50
Washed gravel, f.o.b. Ill., Ky., net ton, carloads	$15.50-16.00

Ferroalloys

Dollars, except Ferrochrome

Ferromanganese, 78-82% tidewater, duty paid	85.00
Do., Balti. base..	85.00
Do., del. Pittsburgh	89.79
Spiegeleisen, 19-20%, dom. fur. spot†..	26.00
Ferrosilicon 50%, freight all., cl.	77.50
Do., less carload..	85.00
Do., 75 per cent..	126-130.00
Spot, $5 a ton higher.	
Silicomang., 2½ carb.	90.00
2% carbon 95.00; 1%	105.00
Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb. con. del.	10.00
Ferrotungsten, stand., lb. cont. del.	1.35- 1.45
Ferrovanadium, 35 to 40% lb., cont., on analysis	2.70- 2.90
Ferrotitanium, c. l., prod. plant, frt. allow., net ton	137.50
Spot, 1 ton, frt., allow., lb.	7.00
Do., under 1 ton..	7.50
Ferrophosphorus, per ton, c. l., 17-19%, Rockdale, Tenn., basis, 18%, $2 unitage	42.00
Ferrophosphorus, electrolytic, per ton c. l., 23-26% f.o.b. Anniston, Ala., 24% $2.75 unitage	55.00
Ferromolybdenum, stand. 50-60%, lb.	0.95
Molybdate, lb. cont.	0.80

†Carloads, Quan. diff. apply

Nonferrous Mill Products

F.o.b. mill base, cents per lb. except as specified. Copper, brass products based on 9.00c Conn. copper

Sheets

Yellow brass (high)	14.50
Copper, hot rolled....	16.00
Lead, cut, to jobbers	7.50
Zinc, 100-lb. base....	9.50

Tubes and Pipes

High yellow brass..	17.00
Seamless copper	17.25

Rods

High yellow brass..	13.00
Copper, hot rolled..	13.25

Anodes

Copper untrimmed..	13.75

Wire

Yellow brass (high)	15.00

Old Metals

Deal, buying prices, cents lb.

No. 1 Composition Red Brass

New York	4.37½-4.62½
Chicago	4.12-4.37½
Cleveland	4.50- 5.00
St. Louis	4.25- 4.50

Heavy Copper and Wire

New York	5.75- 6.00
*Chicago, No. 1	5.37½-5.62½
Cleveland	5.25- 5.50
St. Louis	5.25- 5.50

Composition Brass Borings

New York	4.12½-4.37½

Light Copper

New York	4.50- 4.75
*Chicago	4.00- 4.25
Cleveland	4.75- 5.00
St. Louis	4.25- 4.50

Light Brass

*Chicago	2.00- 2.25
Cleveland	2.25- 3.00

Lead

*New York	2.75- 3.00
Cleveland	2.75- 3.00
*Chicago	2.62½-2.87½
*St. Louis	2.75- 2.85

Zinc

*New York	1.87½-2.12½
Cleveland	1.75- 2.00
*St. Louis	2.50- 2.60

Aluminum

Borings, Cleveland..	6.00- 7.00
Mixed, cast, Cleve..	10.25-11.00
Mixed, cast, St. L....	9.25-10.25
Clips, soft, Cleve....	12.00-13.00

Secondary Metals

Brass ingot, 85-5-5-5	8.75
Stand. No. 12 Alum.	14.00

Iron and Steel Scrap Prices

Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated

HEAVY MELTING STEEL

Birmingham	8.00- 8.50
Boston, dealers	5.00- 5.25
Buffalo, No. 1	9.50-10.50
Buffalo, No. 2	8.50- 9.00
Chicago, No. 1	8.50- 9.00
Cleveland, No. 1	8.00- 8.50
Cleveland, No. 2	7.50- 8.00
Detroit, No. 1	7.75- 8.25
Detroit, No. 2	6.75- 7.25
Eastern Pa.	9.50- 9.75
Eastern Pa., No. 2	8.00- 8.50
Federal, Ill.	7.00- 7.50
Granite City, R. R.	7.25- 7.75
Granite City, No. 2	6.25- 6.75
N. Y., deal. R. R.	8.00
N. Y., deal. No. 2	6.50
Pittsburgh, No. 1	10.50-11.00
St. Louis	6.50- 7.00
Valleys, No. 1	10.50

COMPRESSED SHEETS

Buffalo, dealers	8.50- 9.00
Chicago, factory	7.50- 8.00
Cleveland	7.00- 7.50
Detroit	7.75- 8.25
E. Pa., new mat.	9.00- 9.50
Pittsburgh	10.25-10.75
St. Louis	5.00- 5.50
Valleys	10.00

BUNDLED SHEETS

Buffalo	6.50- 7.00
Cincinnati, del.	6.00- 6.50
Cleveland	6.50- 7.00
Pittsburgh	8.75- 9.25
St. Louis	4.00- 4.25

SHEET CLIPPINGS, LOOSE

Chicago	4.00- 4.50
Cincinnati	4.50- 5.00
Detroit	4.50- 5.00
St. Louis	3.50- 4.00

STEEL RAILS, SHORT

Birmingham	10.00-10.50
Buffalo	12.00-12.50
Chicago (3 ft.)	9.50-10.00
Chicago (2 ft.)	10.25-10.75
Cincinnati, del.	9.75-10.25
Detroit	10.00-10.50
Pitts., open-hearth, 3 ft. and less	13.50-14.00
St. Louis, 2 ft. & less	10.00-10.50

STEEL RAILS, SCRAP

Boston	5.00- 5.25
Chicago	8.00- 8.50
Pittsburgh	10.75-11.25

STOVE PLATE

Birmingham	5.50- 6.00
Boston, dealers	3.25- 3.75
Buffalo	8.00- 8.50
Chicago, net	5.50- 6.00
Cincinnati, dealers	5.00- 5.50
Detroit, net	6.00- 6.50
Eastern Pa.	8.50
N. Y., deal. fdry.	6.00
St. Louis	5.00- 5.50

COUPLERS, SPRINGS

Buffalo	12.00-12.50
Chicago, springs	9.25- 9.75
Eastern Pa.	12.50-13.00
Pittsburgh	13.50-14.00
St. Louis	8.50- 9.00

ANGLE BARS—STEEL

Chicago	9.00- 9.50
St. Louis	7.75- 8.25

RAILROAD SPECIALTIES

Chicago	9.25- 9.75

LOW PHOSPHORUS

Buffalo, billets and bloom crops	11.50-12.00
Cleveland, billet, bloom crops	13.00-13.50
Eastern Pa., crops	13.50-14.00
Pittsburgh, billet, bloom crops	13.50-14.00
Pittsburgh, sheet bar crops	12.50-13.00

FROGS, SWITCHES

Chicago	8.00- 8.50
St. Louis, cut	8.50- 9.00

SHOVELING STEEL

Chicago	8.00- 8.50
Federal, Ill.	6.75- 7.00
Granite City, Ill.	6.50- 7.00

RAILROAD WROUGHT

Birmingham	7.00- 7.50
Boston, dealers	6.00- 6.50
Buffalo, No. 1	7.50- 8.00
Buffalo, No. 2	10.00-10.50
Chicago, No. 1, net	7.00- 7.50
Chicago, No. 2	8.50- 9.00
Cincinnati, No. 2	7.00- 7.50
Eastern Pa.	9.50
N. Y., No. 1, deal.	7.00- 7.50
St. Louis, No. 1	5.75- 6.25
St. Louis, No. 2	6.75- 7.25

SPECIFICATION PIPE

Boston	3.00- 3.25
Eastern Pa.	8.00
New York, dealers	3.50- 3.75

BUSHELING

Buffalo, No. 1	8.50- 9.00
Chicago, No. 1	7.00- 7.50
Cinci., No. 1, deal.	5.50- 6.00
Cincinnati, No. 2	3.50- 4.00
Cleveland, No. 2	6.50- 7.00
Detroit, No. 1, new	6.75- 7.25
Valleys, new No. 1	9.75

MACHINE TURNINGS

Birmingham	4.50- 5.00
Boston, dealers	1.00
Buffalo	4.00- 4.50
Chicago	4.50- 5.00
Cincinnati, dealers	4.00- 4.50
Cleveland	6.00- 6.50
Detroit	4.50- 5.00
Eastern Pa.	5.00- 5.50
New York, dealers	1.75- 2.00
Pittsburgh	7.25- 7.75
St. Louis	3.00- 3.50
Valleys	7.50- 8.00

BORINGS AND TURNINGS

For Blast Furnace Use

Boston, dealers	3.25- 3.50
Buffalo	5.50- 6.00
Cincinnati, dealers	4.00- 4.50
Cleveland	6.50- 7.00
Detroit	5.50- 6.00
Eastern Pa.	5.00
New York, dealers	1.50- 1.75
Pittsburgh	6.00- 6.50

CAST IRON BORINGS

Birmingham, plain	4.50- 5.00
Boston, chemical	8.50- 9.00
Boston, dealers	3.25- 3.50
Buffalo	5.50- 6.00
Chicago	5.00- 5.50
Cincinnati, dealers	4.00- 4.50
Cleveland	6.75- 7.25
Detroit	5.50- 6.00
E. Pa., chemical	12.00-13.00
New York, dealers	1.50- 1.75
Pittsburgh	6.00- 6.50
St. Louis	3.00- 3.50

PIPE AND FLUES

Cincinnati, dealers	4.00- 4.50

RAILROAD GRATE BARS

Buffalo	6.50- 7.00
Chicago, net	5.50- 6.00
Cincinnati	4.00- 4.50
Eastern Pa.	8.00- 8.50
New York, dealers	4.50- 4.75
St. Louis	4.00- 4.50

FORGE FLASHINGS

Boston, dealers	3.50
Buffalo	8.50- 9.00
Cleveland	7.00- 7.50
Detroit	6.25- 6.75

FORGE SCRAP

Boston, dealers	3.50
Chicago, heavy	9.50-10.00
Eastern Pa.	9.00

ARCH BARS, TRANSOMS

St. Louis	10.00-10.50

AXLE TURNINGS

Boston, dealers	4.00- 4.50
Buffalo	7.00- 7.50
Chicago, elec. fur.	7.50- 8.00
Cleveland	6.00- 6.50
Eastern Pa.	9.00
St. Louis	6.00- 6.25

STEEL CAR AXLES

Birmingham	10.00-10.50
Boston, ship. point.	9.00- 9.50
Buffalo	12.00-12.50
Chicago, net	10.00-10.50
Eastern Pa.	14.00-15.00
St. Louis	10.00-10.50

SHAFTING

Boston, ship. point.	10.50-10.75
Eastern Pa.	15.00-15.50
New York, dealers	10.75-11.25
St. Louis	11.00-11.50

CAR WHEELS

Birmingham, iron	8.50- 9.00
Boston, iron deal.	5.75- 6.00
Buffalo, iron	11.00-11.50
Buffalo, steel	12.00-12.50
Chicago, iron	9.50-10.00
Chicago, rolled steel	9.50-10.00
Cincinnati, iron	7.50- 8.00
Eastern Pa., iron	11.00-11.50
Eastern Pa., steel	12.50-13.00
Pittsburgh, iron	10.00-10.50
Pittsburgh, steel	13.50-14.00
St. Louis, iron	7.25- 7.75
St. Louis, steel	8.75- 9.25

NO. 1 CAST SCRAP

Birmingham	8.50- 9.50
Boston, No. 2	6.00
Boston, tex. con.	9.00- 9.50
Buffalo, cupola	9.50-10.00
Buffalo, mach.	10.00-10.50
Chicago, agri. net	6.75- 7.25
Chicago, mach. net	8.00- 8.50
Chicago railroad net	7.25- 7.75
Cinci., mach. cup.	8.50- 9.00
Cleveland, cupola	10.75-11.25
Detroit, net	8.50- 9.00
Eastern Pa., cupola	11.00-11.50
Pittsburgh, cupola	12.00-12.50
San Francisco, del.	13.50-14.00
Seattle	7.00- 8.50
St. Louis, No. 1	6.50- 7.00
St. L., No. 1 mach.	8.50- 9.00

HEAVY CAST

Boston, del.	4.50- 4.75
Buffalo, break.	7.75- 8.25
Cleveland, break.	7.50- 8.00
Detroit, break.	6.50- 7.00
Detroit, auto net	9.00- 9.50
Eastern Pa.	9.50-10.00
N. Y., break. deal.	5.00- 5.50
Pittsburgh	10.00-10.50

MALLEABLE

Boston, consum.	10.00-10.50
Buffalo	10.50-11.00
Chicago, R. R.	9.00- 9.50
Cincinnati, agri. del.	7.50- 8.00
Cleveland, rail	10.75-11.25
Detroit, auto	8.50- 9.00
St. Louis, R. R.	7.50- 8.00
Eastern Pa., R. R.	11.50-12.00

RAILS FOR ROLLING

5 feet and over

Birmingham	9.50-10.00
Boston, dealers	8.00- 8.50
Buffalo	10.25-10.75
Chicago	9.50-10.00
Eastern Pa.	12.00-12.50
New York, dealer	7.50- 8.00
St. Louis	9.00- 9.50

LOCOMOTIVE TIRES

Chicago (cut)	9.00- 9.50
St. Louis, No. 1	9.50-10.00

LOW PHOS. PUNCHINGS

Buffalo	13.75-14.25
Chicago	9.50-10.00
Eastern Pa.	14.50-15.00
Pittsburgh	12.25-12.75

Nonferrous Metal Prices of the Week

Spot unless otherwise specified. Cents per pound

	Copper			Straits Tin		Lead	Lead	Zinc	Aluminum	Antimony	Nickel
	Electro., del. Conn.	Lake, del. Midwest	Casting, refinery	New York Spot	New York Futures	N. Y.	East St. L.	St. L.	98-99%	Spot, N. Y.	Cathodes
Sept. 22	9.00	9.12½	8.75	51.55	51.45	3.65	3.50	4.00	*22.90	8.75	35.00
Sept. 24	9.00	9.12½	8.75	51.60	51.50	3.65	3.50	4.00	*22.90	8.75	35.00
Sept. 25	9.00	9.12½	8.75	51.45	51.40	3.60	3.45	4.00	*22.90	8.75	35.00
Sept. 26	9.00	9.12½	8.75	51.50	51.40	3.60	3.45	3.95	*22.90	8.75	35.00
Sept. 27	9.00	9.12½	8.75	51.30	51.25	3.60	3.45	3.95	*22.90	8.75	35.00
Sept. 28	9.00	9.12½	8.75	51.40	51.35	3.60	3.45	3.90	*22.90	8.75	35.00

*Nominal range 19.00c to 22.90c.

Warehouse Iron and Steel Prices

Cents per pound for delivery within metropolitan districts of cities specified

STEEL BARS	□
Baltimore*	2.90c
Boston††	2.95c
Buffalo	3.00c
Chattanooga	3.31c
Chicago	2.95c
Cincinnati	3.15c
Cleveland	2.95c
Detroit	3.03½c
Houston	3.00c
Los Angeles	3.70c
New Orleans	3.30c
New York‡(d)	3.22c
Pittsburgh(h)	2.90c
Philadelphia*	2.90c
San Francisco	3.60c
Seattle	3.60c
St. Louis	3.19c
St. Paul	3.00c
Tulsa	3.25c

IRON BARS	□
Portland	3.40c
Chattanooga	3.31c
Baltimore*	3.00c
Chicago	2.75c
Cincinnati	3.15c
New York‡(d)	3.32c
Philadelphia*	2.90c
St. Louis	3.19c
Tulsa	3.25c

REINFORC. BARS	□
Buffalo	2.60c
Chattanooga	3.31c
Chicago	2.10c-2.60c
Cleveland (c)	1.97½c
Cincinnati	3.25c
Houston	3.25c
Los Ang., cl	2.15c
New Orleans	3.50c
Pitts., plain(h)	3.05c
Pitts., twisted squares (h)	3.175c
San Francisco	2.45c
Seattle	3.50c
St. Louis	3.24c
Tulsa	3.25c
Young	2.30c-2.60c

SHAPES	□
Baltimore*	3.90c
Boston††	3.17c
Buffalo	3.25c
Chattanooga	3.56c
Chicago	3.20c
Cincinnati	3.40c
Cleveland	3.31c
Detroit	3.40c
Houston	3.00c
Los Angeles	3.70c
New Orleans	3.55c
New York(d)	3.37c
Philadelphia*	2.95c
Pittsburgh(h)	3.15c
Portland	3.55c
San Francisco	3.55c
Seattle	3.55c
St. Louis	3.44c
St. Paul	3.25c
Tulsa	3.50c

PLATES	□
Baltimore*	2.90c
Boston††	3.18c
Buffalo	3.37c
Chattanooga	3.56c
Chicago	3.20c
Cincinnati	3.40c
Cleveland, ¼-in. and over	3.31c
Detroit	3.40c
Detroit, ⅜-in.	3.65c
Houston	3.00c
Los Angeles	3.70c
New Orleans	3.55c
New York(d)	3.40c
Philadelphia*	2.95c
Phila. floor	4.95c
Pittsburgh(h)	3.15c
Portland	3.55c
San Francisco	3.55c
Seattle	3.55c
St. Louis	3.44c
St. Paul	3.25c
Tulsa	3.50c

NO. 10 BLUE	□
Baltimore*	3.05c
Boston††	3.25c
Buffalo	3.62c
Chattanooga	3.36c
Chicago	3.00c
Cincinnati	3.20c
Cleveland	3.11c
Det., 8-10 ga.	3.13½c
Houston	3.35c
Los Angeles	3.80c
New Orleans	3.55c
New York	3.27c
Portland	3.75c
Philadelphia*	3.05c
Pittsburgh(h)	2.95c
San Francisco	3.75c
Seattle	3.75c
St. Louis	3.29c
St. Paul	3.45c
Tulsa	3.70c

NO. 24 BLACK	□
Baltimore*†	3.51c
Boston (g)	3.90c
Buffalo	3.25c
Chattanooga	4.21c
Chicago	3.85c
Cincinnati	4.05c
Cleveland	3.91c
Detroit	3.93½c
Los Angeles	4.45c
New York	3.85c
Philadelphia*†	3.55c
Pitts.** (h)	3.55c
Portland	4.40c
San Francisco	4.40c
Seattle	4.40c
St. Louis	4.09c
St. Paul	3.695c
Tulsa	4.75c

NO. 24 GAL. SHEETS	□
Baltimore *†	4.21c
Buffalo	4.00c
Boston (g)	4.55c
Chattanooga	4.86c
Chicago (h)	4.55c
Cincinnati	4.70c
Cleveland	4.61c
Detroit	4.70c
Houston	4.40c
Los Angeles	5.05c
New Orleans	4.95c
New York	4.50c
Philadelphia*†	4.25c
Pitts.** (h)	4.15-4.45c
Portland	5.00c
San Francisco	5.00c
Seattle	5.00c
St. Louis	4.79c
St. Paul	4.19c
Tulsa	5.10c

BANDS	□
Baltimore*	3.15c
Boston††	3.25c
Buffalo	3.42c
Chattanooga	3.61c
Chicago	3.30c
Cincinnati	3.45c
Cleveland	3.36c
Detroit, ⅜-in. and lighter	3.38½c
Houston	3.25c
Los Angeles	3.90c
New Orleans	3.95c
New York(d)	3.62c
Philadelphia	3.15c
Pittsburgh(h)	3.70c
Portland	3.90c
San Francisco	4.05c
Seattle	3.90c
St. Louis	3.54c
St. Paul	3.20c
Tulsa	3.45c

HOOPS	□
Baltimore	2.80c
Boston	4.25c
Buffalo	3.42c
Chicago	3.30c
Cincinnati	3.45c
Det., No. 14 and lighter	3.38½c
New York	3.62c
Philadelphia	3.40c
Pittsburgh(h)	3.70c
Seattle	5.60c
St. Louis	3.54c
St. Paul	3.75c

COLD FIN. STEEL	□
Baltimore(c)	3.71c
Boston	4.00c-4.50c
Buffalo (h)	3.55c
Chattanooga*	4.06c
Chicago (h)	3.50c
Cincinnati	3.70c
Cleveland(h)	3.50c
Detroit	3.63½c
Los Ang.(f)(d)	4.95c
New Orleans	4.30c
New York	3.92c-4.42c
Philadelphia	3.73c
Pittsburgh(h)	3.45c
Portland (f)	4.75c
San Fran.(f)(d)	5.95c
Seattle(f)(d)	4.75c
St. Paul	3.20c
St. Louis	3.74c
Tulsa	4.65c

COLD ROLL. STRIP	□
Boston, 0.100-in., 500 lb. lots	5.35c
Buffalo	3.39c
Chicago	3.27c
Cincinnati(b)	3.42c
Cleveland (b)	3.20c
Detroit	3.33c
New York	4.70c
St. Louis	3.36c

Current Iron and Steel Prices of Europe

Dollars at Rates of Exchange, Sept. 27

Export Prices f. o. b. Ship at Port of Dispatch—By Cable (or Radio)

	British gross tons U. K. ports £ s d		Continental Channel or North Sea ports, metric tons Gold parity, $4.8665 £ s d	£ s d
PIG IRON				
Foundry, 2.50-3.00 Silicon	$14.91	3 0 0	$8.04	1 13 0
Basic bessemer	13.42	2 14 0*	7.55	1 11 0
Hematite, Phos. .03-.05	15.03	3 0 6	....	.....
SEMIFINISHED STEEL				
Billets	$27.34	5 10 0	$11.44	2 7 0
Wire rods, No. 5 gage	37.28	7 10 0	21.90	4 10 0
FINISHED STEEL				
Standard rails	$38.52	7 15 0	$26.77	5 10 0
Merchant bars	1.67c	7 10 0	.69c to .72c	3 2 6 to 3 5 0
Structural shapes	1.64c	7 7 6	.68c	3 1 6
Plates, †¼ in. or 5 mm	1.78c	8 0 0	.91c	4 2 6
Sheets, black, 24 gage or 0.5 mm	2.05c	9 5 0	1.16c	5 5 0
Sheets, gal., 24 gage, corr	2.50c	11 5 0	1.43c	6 10 0
Bands and strips	1.83c	8 5 0	.88c	4 0 0
Plain wire, base	2.05c	9 5 0	1.18c	5 7 6
Galvanized wire, base	2.50c	11 5 0	1.38c to 1.40c	6 5 6 to 6 7 6
Wire nails, base	2.66c	12 0 0	1.27c	5 15 0
Tin plate, box 108 lbs	$ 4.47	0 18 1	.....	.....

British ferromanganese $85 delivered Atlantic seaboard, duty-paid. German ferromanganese £9 0s 0d $(43.74) f.o.b.

Domestic Prices at Works or Furnace—Last Reported

	£ s d		French Francs		Belgian Francs		Reich Marks
Fdy. pig iron, Si. 2.5	$16.77	3 7 6(a)	$13.97	210	$14.63	310	$25.43	63
Basic bessemer pig iron	16.77	3 7 6(a)	*12.30	185	13.45	285	28.05	(b)69.50
Furnace coke	4.16	0 17 6	7.98	120	5.19	110	7.69	19
Billets	27.34	5 10 0	28.60	430	20.77	440	38.95	96.50
Standard rails	1.83c	8 5 0	2.10c	700	2.31c	1,100	2.42c	132
Merchant bars	1.91c	8 12 0	1.68c	560	1.16c	550	2.01c	110
Structural shapes	1.94c	8 15 0	1.65c	550	1.16c	550	1.97c	107.50
Plates, †¼-in. or 5 mm	1.87c	8 8 9	2.10c	700	1.47c	700	2.32c	127
Sheets, black	2.33c	10 10 0§	2.55c	850‡	1.63c	775‡	2.64c	144‡
Sheets, galv., corr., 24 ga. or 0.5 mm	2.89c	13 0 0	4.50c	1,500	3.15c	1,500	6.77c	370
Plain wire	2.05c	9 5 0	3.39c	1,130	2.31c	1,100	3.17c	173
Bands and strips	2.08c	9 7 0	1.95c	650	1.47c	700	2.32c	127

*Basic. †British ship-plates. Continental, bridge plates. §24 ga. ‡1 to 3 mm. basic price British quotations are for basic open-hearth steel. Continental usually for basic-bessemer steel. a del. Middlesbrough. b Since January.

(b) Plus straightening, cutting and quantoty differentials.

(c) Plus mill, size and quantity extras.

(d) Minus quant. diff.

(e) New mill classif.

(f) Rounds only.

(g) 50 bundles or over.

(h) Outside delivery, 10c less.

‡Domestic bars.

*Plus quan. extras.

**Under 25 bundles.

*†50 or more bundles.

†New extras apply.

††Base 40,000 lbs. extras on less.

Prices at Detroit, Cleveland, Chicago, Pittsburgh, Cincinnati, Chattanooga, New York, Boston, St. Louis on heavier lines are subject to new quantity differentials:

399 pounds and less, up 50 cents; 400 to 9999 pounds, base; 10,000 to 19,999 pounds, 15 cents under; 20,000 to 39,999 pounds, 25 cents under; 40,000 pounds and over, 35 cents under base.

Bars

Bar Prices, Page 50

Pittsburgh — Typical of the uncertainties of bar buyers, a user last week stated he could buy 400 to 500 tons of bars outright but, still mindful of last June's price reductions, would not obligate himself into the future. However, the general run of merchant steel bar buying is slightly heavier. Merchant steel bars hold steady at 1.80c, base Pittsburgh, and hot-rolled alloy bars, 2.45c, base Pittsburgh.

Cleveland—Beginning the fourth quarter, producers' books are barren of contracts, few consumers committing themselves for more than immediate requirements. Specifications generally are so light that mills can be scheduled only a few days ahead. Indications pointed to continuation of operations here this week at around 20 per cent. Forging shops working on automobile account purchased a little more liberally, and some fairly good orders were booked from agricultural implement manufacturers.

Chicago — Automotive, farm implement and tractor interests contribute to a slightly better demand for steel bars. Some small improvement also is noted in needs of miscellaneous users. Better activity in automotive and farm implement buying is looked for in October with heavier production of new automobile models expected to start in November. Demand for farm machinery has improved recently but definite manufacturing plans for the industry have yet to be disclosed and steel buying still is limited.

Boston—Small orders for commercial steel bars are more numerous, but the total tonnage is light, railroads are taking little material.

New York—Reduced stocks at consumers' plants generally are leading to some improvement in bar specifications, although bolt and nut manufacturers, comprising one of the larger consuming groups in this district, are showing little interest at the moment. Railroads are taking figures on fourth quarter tonnage, and further have been specifying a little more freely.

Philadelphia — Bar specifications are more numerous, but the total tonnage involved is small, consumers covering only nearby requirements. Inquiry includes 178 tons of galvanized bars and bands for the navy. The base price is 1.80c, Pittsburgh, or 2.09c, Philadelphia.

Hardie-Tynes Mfg. Co., Birmingham, Ala., has been awarded eight sets of slide gates for the Tennessee Valley Authority, Washington at $159,000.

Plates

Plate Prices, Page 50

Pittsburgh—The market is slightly more active and is led by inquiry for a 620-ton barge for the Semet-Solvay Corp., Syracuse, N. Y., for use as a mooring unit at Baton Rouge, La. This barge will be 305 x 40 x 10 feet; cement-type construction also is being considered. Ohio River Co., Cincinnati, promises to close at once on an old inquiry for a work hull taking around 200 tons. In the tank market, Pittsburgh-Des Moines Steel Co., Neville Island, closed on several elevated tanks for Steubenville, O., Sept. 24. Low bid of $1840 took an order for 25 tons of buckle plates last week for Independent Bridge Co., Pittsburgh, through the war engineers here, and Kinnear Mfg. Co., Pittsburgh, was low in the same letting for seven sets of steel rolling doors at $2376. Bids have been readvertised for Oct. 6 on ten pontoons and 600 feet of 34-inch dredge pipe for the St. Louis engineers, this job requiring an estimated 500 tons of plates. The market is steady at 1.80c, Pittsburgh.

Cleveland—Railroads and tankbuilders place occasional carload orders for plates. Fairport, O., took bids Sept. 28, and is expected to make an award this week for construction of a steel water pipe line and elevated tank, requiring 150 tons of plates and shapes.

Chicago—Plate orders are light and principally from miscellaneous users. With little betterment in requirements of railroads or tank builders in early prospect, plate mills look to various government projects to provide heavier tonnages. In most cases, however, shipments for the latter work will be spread over an extended period and little business of this nature is in early prospect.

Boston—Miscellaneous buying of plates has broadened and is slightly heavier. Vergennes, Vt., has taken bids on a 500,000 gallon water tank. Bids on the first steel, including plates, for the destroyers to be built at the Boston navy yard open at Washington Oct. 12. Plates are steady at 2.20c, Boston.

New York—Tank demand is more active, with three projects involving 1800 tons of plates placed and 10 projects involving approximately 5000 tons under contemplation. This demand arises out of domestic requirements of oil companies. These interests actively are figuring on even heavier tonnages for export. Standard Oil requirements for Argentina, including structural shapes, now are estimated at close to 15,000 tons. Of interest is the purchase of high tensile steel in lieu of tank plates for repairs to a tanker here. Two private yards are expected momentarily to allocate tonnage for navy work.

Philadelphia—Bids are being asked on the initial requirements of the navy for boats to be built in its own yards. Tenders will be opened in two weeks on 3540 tons of plates and sheets, of which 1088 tons are for the Puget Sound yard, 1145 tons for Norfolk, 763 tons for Boston and 544 tons for Mare Island.

Of the 3540 tons, 1792 tons will be galvanized plates, 1083 tons of black plates, 425 tons of galvanized sheets and 250 tons of black sheets. The navy opens bids Oct. 12 on 178 tons of galvanized bands and bars.

General plate buying is slightly improved, but the month just closed has proved a general disappointment to sellers. A shorter month than August, September failed to show sufficient gain to offset this handicap, according to some producers. Recent reports of a 700-ton steel pipe inquiry for the Philadelphia water department are denied by municipal officials. Railroad specifications may show some improvement next month with the possibility of better releases by the Reading for car repairs. The base price is 1.90c, Coatesville, Pa., or 1.98½c, Philadelphia.

Contracts Placed

200 tons, four land booster cars for Fort Peck, Mont., dam, to unnamed interest.

100 tons, tunnel forms for metropolitan water district, Los Angeles, to unnamed interest.

100 tons, elevated tanks for Steubenville, O., to Pittsburgh-Des Moines Steel Co. Neville Island, Pittsburgh, on Sept. 24 bids.

Unstated tonnage, steel storage tank, Sulligent, Ala., to Chicago Bridge & Iron Works at $9840.

Unstated tonnage, steel standpipe, Kenosha, Wis., to Graver Tank & Mfg. Corp., Chicago.

Contracts Pending

3540 tons, plates and sheets, navy department, Washington; bids to be opened about Oct. 15.

1300 tons, three standpipes, Lowell, Mass.; bids Oct. 8.

620 tons, one steel mooring barge, 305 x 40 x 10 feet, for use at Baton Rouge, La., for Semet-Solvay Corp., Syracuse, N. Y.

500 tons, ten small steel pontoons, and 600 feet of 34-inch dredge pipe, St. Louis engineers; bids of Sept. 21 to be readvertised for Oct. 6.

200 tons, work hull, for Ohio River Co., Cincinnati.

150 tons, 10 steel deck pontoons, trucks

and 600 feet, 34-inch discharge pipe, United States engineer, St. Louis; bids postponed to Oct. 6.

120 tons, 250,000-gallon tank, Brawley, Calif.; Chicago Bridge & Iron Works, Chicago, low.

Unstated tonnage, steel barges, 100 x 30 x 7 feet, United States engineer, Norfolk, Va.; bids Oct. 19.

Sheets

Sheet Prices, Page 50

Philadelphia—The improvement in sheet demand is outstanding among the major products. While the market is far from brisk, one leading seller reports an increase in the month just closed of about 40 per cent over August. Buying by stovemakers, radio manufacturers and for autobody work holds promise of further gain for this month. The navy opens bids around the middle of October on 425 tons of galvanized sheets and 240 tons of black sheets, as an initial requirement for boats recently allocated to its own yards. Bids are to be opened Oct. 2 by the state of Pennsylvania on 250 tons of license tag sheets, 25 gage, for fourth quarter. The tags will be fabricated at the Western State penitentiary.

Some confusion still exists in regard to the new sheet extras. For instance, on mixed less-than-carlot shipments, galvanized forms and galvanized flat parts, there is question as to whether square feet or the weight should be the governing factor.

Pittsburgh—As users continue to deplete their stocks, considerably more buying is noted, but forward commitments are lacking. The market is steady at 2.40c, base Pittsburgh, for black sheets; 3.10c for galvanized; and 1.85c for No. 10 gage hot rolled. Cold rolled prices also are steady.

Cleveland—Some sheet producers feel encouraged by the outlook in the automobile industry and prospects for renewed buying early in October. So far, however, the orders from that source have been restricted mainly to specifications from partsmakers, who are beginning work for 1935 models, notably for Chevrolet and Plymouth. Cleveland sheet mills are practically idle during the week, and in a nearby lake district the sheet mills were idle for the second consecutive week. Makers are finishing 1933 models, for which inventories are ample. Fairly good orders are being placed by stovemakers and miscellaneous manufacturing requirements.

Chicago—While sheet mills have experienced a slight pick-up in sales and shipments, major betterment in demand from the automotive industry has yet to appear. Automotive buying is slightly heavier but this involves only small lots either for fill-in requirements or for experimental work on new models. Better operations among the farm implement and other sheet consuming industries during fourth quarter are expected to be reflected in sheet mill operations which recently have shown but little change. Chicago has placed 46,000 vitreous enameled street signs with the Day-Brite Reflector Co., St. Louis.

Boston—Sheet demand is unchanged with some buying by small tank builders for oil burner units, range producers and stamping shops. Buying, however, is generally close to actual requirements, with an occasional car lot.

New York—Sheet sales in September showed improvement over August. With consumers' stock virtually depleted in many cases, sellers look for further increase this month. Prices are unchanged.

Buffalo—District sheet mills are operating at only 15 to 20 per cent. Current bookings are light.

Cincinnati—Sheet demand has shown a steady, though moderate, gain during the past three weeks. Light specifying for 1934 automotive models continues. Buyers generally are holding orders to early requirements.

St. Louis—Manufacturers and distributors of steel sheets continue to complain of a lack of new orders and specifications. The principal consumers have not increased their activities, and reliance for business is chiefly on miscellaneous sources. Certain farm implement manufacturers have increased their orders slightly.

Birmingham, Ala.—Sheet mills are maintaining a fairly steady operation in the Birmingham district. Considerable tonnage is going to agricultural districts.

Railroads

Track Material Prices, Page 51

While steel orders from railroads and equipment interests continue light, activities of the carriers through various agencies in seeking establishment of improved operations and earnings eventually are expected to result in substantial business. Changes in tracks necessary to accommodate high-speed passenger trains constitute a problem now receiving the attention of various roads which have ordered or contemplate purchasing such equipment. Track changes now in prospect constitute alterations of curves principally, with no additional rail orders in sight for such work.

The Pennsylvania and several other eastern railroads opened bids last week on their fourth quarter requirements. As the carriers, notably the Pennsylvania specified very lightly in the third quarter, the belief prevails among some producers that releases in the current quarter should be better. Outstanding in the market is an inquiry from the National Railways of Mexico for 1000 box cars.

Car Orders Pending

National Railways of Mexico, Mexico City; 1000 box cars.

Rail Orders Pending

Chesapeake & Ohio railroad, Cleveland; 250 tons track accessories.

Delaware River Bridge commission, Philadelphia; five miles of 100-pound rails and 13,200 feet of 100-pound guard rail, approximately 600 tons; also track specialties.

Pipe

Pipe Prices, Page 51

Pittsburgh—Material specifications for the Tygart river reservoir dam near Grafton, W. Va., include 478 tons of 3-inch standard pipe, 42 tons of ½-inch galvanized pipe and 35 tons of 1½-inch galvanized pipe. General contractor bids will be opened Oct. 16 at Pittsburgh. Meanwhile, the pipe market is fairly well sustained by a fair demand for oil country goods and an improvement in buying of small sizes for steam and water uses. Although pipe mill operations in this district average between 20 and 25 per cent of capacity, one mill here last week, in rushing to complete a seamless order, operated at close to 100 per cent for four days. There has also been some stock rebuilding by district pipe producers. Eureka Pipe Line Co., Pittsburgh, will build a small 3-inch oil pipe line over Elk river in Kanawha county, W. Va.

Chicago—Cast pipe orders placed here recently are small and include 150 tons of fittings for Chicago and 100 tons of small sizes of pipe for Forest, Ill. While new inquiries also are light, a fairly large tonnage remains pending with delays still present in closing on a number of projects up for several months. Madison, Wis., has placed the general con-

tract for work involving 700 tons of 6 to 12-inch pipe.

Boston—New inquiry for cast pipe is light, but releases against old business are satisfactory. Bids closed late last week on 1000 tons for Vergennes, Vt. The New England foundry is less active than several weeks ago.

New York—Several hundred tons of cast pipe is pending for state hospital and school water and sewer lines, one or two taking about 100 tons each. New inquiry is light and buying generally in small lots. New York is soon to ask contractors' bids on a water line extension in the Central Park section, taking a substantial volume of 48-inch steel pipe.

Birmingham, Ala.—Pipe business is spasmodic with mills operating at under 50 per cent capacity. Numerous contracts are in sight and bids are out on a fair tonnage.

Cast Pipe Placed

1040 tons, 2 to 24-inch, class 150, Phoenix, Ariz., to unnamed interests, general contract to Arizona Concrete Co., Phoenix, Ariz.

430 tons, San Clemente, Calif., to unnamed interest, general contract to F. W. Weber, South Gate, Calif.

168 tons, 6 and 10-inch, class 150, South Pasadena, Calif., to United States Pipe & Foundry Co., Burlington, N. J.

150 tons special fittings, Chicago, to United States Pipe & Foundry Co., Burlington, N. J.

100 tons, Forest, Ill., to James B. Clow & Sons, Chicago.

100 tons, 4 and 8-inch, class 150, Sandy City, Utah, to Pacific States Cast Iron Pipe Co., Provo, Utah.

100 tons, 10-inch and under, Mount Vernon, N. Y., to Warren Foundry & Pipe Co., Phillipsburg, N. J.

Cast Pipe Pending

7469 tons, 12 to 20-inch, class A to H, San Francisco; United States Pipe & Foundry Co., Burlington, N. J., only bidder.

1125 tons, 8 and 12-inch, Washington; bids Oct. 5, district commissioners.

877 tons, 4 to 14-inch, class 150, Brawley, Calif.; M. Matick, Los Angeles, low on general contract.

700 tons, 6 to 12-inch, Madison, Wis.; Permanent Construction Co., Chicago, general contractor.

476 tons, 6-inch, class 150, Williams, Ariz.; O. F. Fisher, Phoenix, Ariz., low.

420 tons, 4 to 14-inch, class 150, Big Timber Mont.; bids in.

350 tons, 12-inch, Bridger, Mont.; bids in.

269 tons, 4 to 10-inch, class 150, Lehi, Utah; bids soon.

147 tons, 4 and 6-inch, class 150, Santa Monica, Calif.; American Cast Iron Pipe Co., Birmingham, Ala., low.

100 tons, small sizes, water and sewer lines, state school, Newark, N. Y., contractors bids in.

100 tons, special fittings for Eighteenth street water tunnel, Chicago; United States Pipe & Foundry Co., Burlington, N. J., recommended for award.

Unstated tonnage, 5200 feet of 6-inch, Watertown, Wis.; bids Oct. 10.

Unstated tonnage, 2900 feet of 4-inch and 1900 feet of 6-inch, as well as 2½ tons of fittings, East Palestine, O.; bids Oct. 1.

Steel Pipe Pending

1500 tons, approximately, caisson lining for New York postoffice project.

115 tons, state highway bridge, LP-34-2, Queens county, N. Y., to McClintic-Marshall Corp., Pittsburgh.

Coke By-Products

Coke By-Product Prices, Page 51

New York—Toluol and benzol are slightly more active. Distillate prices are unchanged and firm. A steady volume of sulphate of ammonia is being booked at unchanged quotations. Shipments of naphthalene are in small spot lots. Phenol is slightly less active at 16.3c a pound in 200-pound lots.

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.....feet floor to ceiling, ... pounds air pressure.

Firm name .....

Address .....

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Shapes

Structural Shape Prices, Page 50

Pittsburgh—Local political factors promise to place actual inquiries further in the background for over 35,000 tons of structural shapes for five Allegheny county bridges. The Fort Pitt Bridge Works, Pittsburgh, has closed on 2000 tons for the new wing of the internal revenue building at Washington, through John McShane, Philadelphia.

Cleveland—General contract bids will be taken Oct. 15 on the Mills, Tappan and Pleasant Hill reservoirs, the first of 15 to be built in the Muskingum, Ohio, watershed project to cost $35,000,000, partly financed by the government. In addition to 1200 tons of concrete bars in these three reservoirs a substantial amount of shapes will be required. Fifteen new bridges are to be built, 84 miles of railroad trackage to be moved, as well as many miles of gas mains and roadways. In all, approximately 10,000 tons of iron and steel will be required for the major construction features. Currently, the structural market here is quiet. The state highway commission is to take bids Oct. 6 and 13 on some bridge work, requiring less than 100 tons.

Chesapeake & Ohio railroad has placed with the Industrial Brownhoist Corp., Bay City, Mich., a contract for a car unloader at Toledo, O., requiring a substantial tonnage of structural steel, and this week is expected to award 400 tons of steel piling, shapes and reinforcing bars for a dock at Toledo.

Chicago—While inquiries for 23,000 tons of Missouri state highway bridges swell the volume of new work, the number of orders and new projects continues relatively small. Awards consist principally of state highway bridges, while local fabricators are figuring mainly bridge work. Cook county closes bids Oct. 2 on 600 tons for a bridge near Niles Center. Cranes for the Grand Coulee, Washington, dam will take 800 tons.

Boston—Pending structural steel requirements are heavy, close to 13,000 tons being active. Bids close Oct. 5 on the superstructure, parcel post building, Boston, 9000 tons. Lawrence, Mass., has bids on a 1000-ton bridge over the Merrimac river, while New Hampshire bridges require slightly more than 500 tons.

New York—Except for approximately 3500 tons for a Hudson river pier shed, Manhattan, structural steel awards are light. The first structural steel for the Triboro bridge since the letting of the Hell Gate section towers is expected out this quarter, probably late next month. The delayed first sections of the New York Central west side program are expected to be revived in about one month. Bids close Oct. 2 on the federal building, downtown Manhattan, taking 17,000 tons of structurals.

Philadelphia—Award of 2000 tons

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Shape Awards Compared

	Tons
Week ended Sept. 29	14,044
Week ended Sept. 22	20,028
Week ended Sept. 15	6,894
This week in 1933	26,981
Weekly average, 1933	9,296
Weekly average, 1934	16,641
Weekly average, August	15,774
Total to date, 1933	569,583
Total to date, 1934	665,641

by a local contractor for the the department of internal revenue building, Washington, and the taking of lump sum bids on construction for the Krebs Pigment & Color Co., Edgemoor, Del., feature the structural market here. Approximately 680 tons of piling is up for shore protection for the state of Delaware and a few hundred tons for miscellaneous bridge work, among the other lesser developments. Shapes are 1.90c, Bethlehem, or 2.00½c, Philadelphia.

Buffalo—Additional inquiries for structural shapes are coming out as school and other projects financed with public funds approach the contract stage. Pending tonnage is the highest in recent years.

Shape Contracts Placed

3500 tons, pier shed No. 32, Hudson river, New York, to Taylor-Fichter Structural Steel Co., New York, with fabricating to be done by Jones & Laughlin Steel Corp., Pittsburgh; through Kenny Bros. Inc., New York.

2000 tons, internal revenue building addition, Washington, to Fort Pitt Bridge Works, Pittsburgh, through John McShane Co., Philadelphia.

900 tons, Texas state highway bridges, principally to Ft. Worth Structural Steel Co., Ft. Worth, Tex.

800 tons, bridge for Seaboard Air Line, near Richmond, Va., to Virginia Bridge & Iron Works, Roanoke, Va.; material will be fabricated at company's Birmingham, Ala., plant.

880 tons, viaduct, Nashville, Tenn., to Nashville Bridge Co., Nashville.

850 tons, bridge, Rob Roy, Ark., to Virginia Bridge & Iron Co., Roanoke, Va.

675 tons, 3-way underpass, Dallas, Tex., to Mosher Steel & Machinery Co., Dallas.

580 tons, addition to federal reserve bank, New York, to Ingalls Iron Works, Birmingham, Ala.

500 tons, crane runways, Boulder dam, Boulder City, Nev., to Shaw-Box Co., Muskegon, Wis.

475 tons, bridge, Bartelso, Ill., to American Bridge Co., Pittsburgh.

475 tons, beam bridge, section 127C, Clinton county, Illinois, to American Bridge Co.

435 tons, state highway bridges, Patuxant river and Catoctin creek, Maryland, to Roanoke Iron & Bridge Co., Roanoke, Va.

250 tons, building for Edwin Knowles China Co., Newell, W. Va., to Pittsburgh Bridge & Iron Works, Rochester, Pa.; through Potter Lumber Co., East Liverpool, O., general contractor.

224 tons, bridge, Sander county, Montana, for bureau of public roads, to unnamed interest.

200 tons, postoffice, Decatur, Ill., to Mississippi Valley Structural Steel Co., Decatur.

190 tons, grade separation, Queens, New York, to McClintic-Marshall Corp., Bethlehem, Pa.; through Wilson & English Construction Co., with 65 tons of concrete bars to Concrete Steel Co., New York.

155 tons, Edison highway bridge, Baltimore, to Shippers' Carline Corp., Milton, Pa.

150 tons, filtration plant, Wood River, Ill., to Banner Iron Works, St. Louis.

150 tons, car barn roof, Lynn, Mass., for Eastern Massachusetts Street Railway Co., to New England Structural Steel Co., Everett, Mass.

130 tons, bridge No. 5385, Minnesota, to Minneapolis-Moline Power Implement Co., Minneapolis.

130 tons, bridge, NRM 385-J, Tarrant county, Texas, to Virginia Bridge & Iron Co., Birmingham, Ala.

125 tons, bridge, Peyton, Colo., to Minneapolis-Moline Power Implement Co., Minneapolis.

125 tons, coal washing plant, Duquoin, Ill., to Joseph T. Ryerson & Son Inc., Chicago.

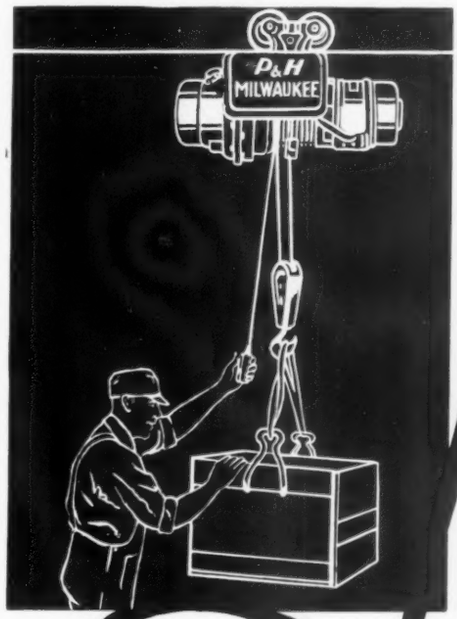
125 tons, Clifton avenue bridge, Cincinnati, to American Bridge Co., Pittsburgh.

110 tons, bridge No. 5382, Minnesota, to American Bridge Co., Pittsburgh.

100 tons, piling for Butte slough outlet gates, Sacramento, Calif., to unnamed interest.

Shape Contracts Pending

2800 tons, tentatively, for Krebs Pigment & Color Co., Edgemoor, Del., subsidiary of E. I. Du Pont de Nemours Inc., Wilmington; lump sum bids being asked.



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23,000 tons, Missouri state highway bridges.

1000 tons, state bridge over Merrimac river, Falls River, Mass.; Central Construction Co. low.

1000 tons, state bridges, New York.

800 tons, cranes, Grand Coulee dam, state of Washington.

700 tons, auditorium, San Jose, Calif.; new bids Oct. 8.

600 tons, Lincoln avenue bridge near Niles Center, Ill.; bids to Cook county engineers, Oct. 2.

600 tons, viaduct, Atlanta, Ga.

550 tons, filtration plant, Ashland, Nebr.

525 tons, state bridges, New Hampshire.

525 tons, Iowa state highway bridges.

500 tons, high school, Sioux Falls, N. Dak.

500 tons, two-story building for fine and specialty steels, for Joseph T. Ryerson & Son Inc., Jersey City, N. J.

450 tons, piling, for Rohoboth Beach, Del.; bids being asked for the state at Dover, Del.

450 tons, sewage disposal plant, Fargo, N. Dak.

400 tons, bridge, Nashville, Tenn.

400 tons, terminal warehouse pier sheds No. 96, for city of Philadelphia.

396 tons, two plate girder underpasses, Lackawanna county, Pa.; Sweeney Bros., Scranton, Pa., low at $298,035; included 19,209 pounds of plain steel bars.

360 tons, three state highway bridges, Colorado.

300 tons, power house, state reformatory, Elmira, N. Y.; bids in.

300 tons, Kentucky state highway department projects; bids Oct. 5 and 8.

230 tons, piling, for Bethany Beach, Del.; bids to be opened by state at Dover, Del.

200 tons, Hampton avenue viaduct, St. Louis; bids Oct. 16.

200 tons, dairy building, Pittsburgh, for Meadow Gold Dairies Inc., Pittsburgh; Henry Busse, Pittsburgh, general contractor.

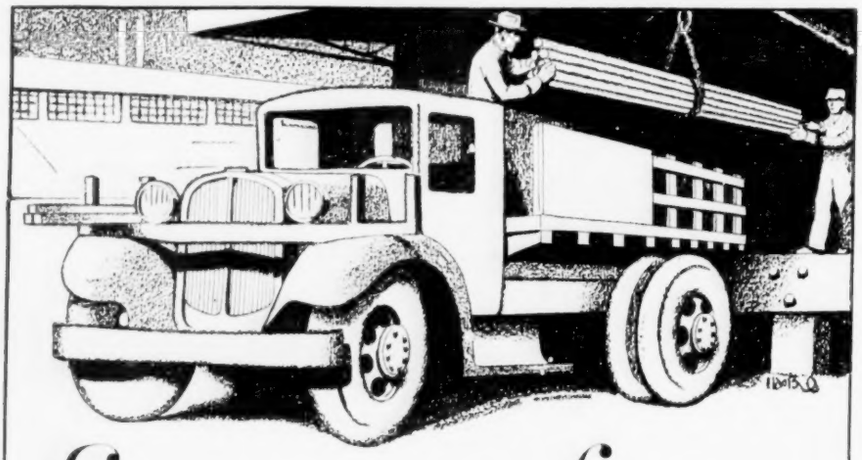
185 tons, railroad bridge, DeWitt, Iowa, for Chicago North Western railroad.

125 tons, high school auditorium, Shorewood, Milwaukee; bids Oct. 3.

120 tons, three bridges in Elk and York counties, Pennsylvania; inquiries to be issued shortly by the state highway department.

117 tons, repairs to Lock No. 14 in the Ohio river near Clarington, O.; bids Oct. 4 to Huntington, W. Va., army engineers; included, 1695 square feet of steel grating.

100 tons, county bridge, Newark, Del.; inquiry expected out early in October.



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Reinforcing

Reinforcing Bar Prices, Page 51

Pittsburgh — Additional to 945 tons of reinforcing steel for the Tygart river reservoir dam near Grafton, W. Va., general contractors, whose bids will be opened Oct. 16, will require miscellaneous lots of pipe for reinforcing work, mesh and expansion joints. In the Sept. 21 Pennsylvania state highway letting, Hardy & Rankin Co., Canonsburg, Pa., are low on Washington county work, and Sweeney Bros., Scranton, Pa., on Lackawanna county, Pennsylvania work. The market is steady at 2.05c for cut lengths of new billet bars.

Cleveland—Small lots of concrete bars are being booked, with total tonnage light. State bridge and road work, on which the Ohio highway commission, Columbus, is taking bids Oct. 6 and 13, requires 100 tons of reinforcing material. The date set

Concrete Awards Compared

	Tons
Week ended Sept. 29	2,162
Week ended Sept. 22	4,281
Week ended Sept. 15	2,675
This week in 1933	2,887
Weekly average for 1933	3,232
Weekly average, 1934	4,678
Weekly average, August	6,834
Total to date, 1933	137,005
Total to date, 1934	187,124

for taking general contract bids on three reservoirs in the Muskingum, Ohio, watershed project is Oct. 15. The government will buy 1200 tons of concrete bars direct for these reservoirs, and it is reported the material will be new billet steel.

Chicago — Hardwick & McGlone, Kansas City, Mo., a combination of two contractors formed for the purpose of participating in this work, were low bidders on a general contract for 18,000 tons of concrete bars for the Ft. Peck, Mont., dam. With the award expected to be deferred about a month, placing of orders for bars will be postponed until late this year or early 1935. The reinforcing bar market otherwise is quiet.

Boston—Concrete bar sellers are figuring a substantial volume, including several hundred tons for bridges and more construction work, the latter being practically all public building. Small awards are slightly more numerous.

New York — All bids were identical on 1000 tons for the department of parks, New York. The award may be by lot or divided. On a revised opening, Turner Construction Co. has the contract for the Bronx market alterations, 680 tons. Awards are light, but a fair volume is active. New Jersey has a new inquiry for close to 500 tons for highway work, closing Oct. 15 while mesh buying covering New York state road requirements continues active.

Reinforcing Steel Awards

1000 tons, viaduct and underpass, Lincoln-Cumberland, Rhode Island, purchased by state from unnamed interest; Frederick Snare Corp., general contractor.

500 tons, highway mesh, Madison and Herkimer counties, New York, to Pittsburgh Steel Co., Pittsburgh; opening of Sept. 25.

275 tons, wind tunnel, Langley Field, Virginia, to Kalman Steel Corp., Bethlehem, Pa.; through J. B. Eurell Co., Philadelphia; unstated tonnage of piling to Jones & Laughlin Steel Corp., Pittsburgh.

200 tons, plant for Santa Cruz Cement Co., Long Beach, Calif., to Graham Bros., Los Angeles.

200 tons, sewers, Yonkers, N. Y., to Truscon Steel Co., Youngstown, O.; through Demena Co.

175 tons, highway mesh, Saratoga county, New York, to Kalman Steel Corp., Bethlehem, Pa.; opening of Sept. 11.

170 tons, highway mesh, Orleans, Nassau and Cortland counties, New York, to American Steel & Wire Co., New York; opening of Sept. 11 and 25.

135 tons, highway, Queens, New York, to Kalman Steel Corp., through P. T. Cox Contracting Co.

107 tons, school, Norwalk, Calif., to unnamed interest.

100 tons, bridges in Johnson county, Wyoming, to unnamed interests.

100 tons, postoffice, Decatur, Ill., to Kalman Steel Corp., Bethlehem, Pa.

100 tons, school, Moline, Ill., to Truscon Steel Co., Youngstown, O.

100 tons, bars and shapes, courthouse and jail, Grady county, Chickasha, Okla., to Capitol Steel & Iron Co., Oklahoma City; D. A. Harmon, general contractor.

100 tons, highway, Nassau county, New York, to Truscon Steel Co., Youngstown, O.; through the Immick Co. Inc.

Reinforcing Steel Pending

18,000 tons, Ft. Peck, Mont., dam; Hardwick & McGlone, Kansas City, Mo., low on general contract.

1000 tons, department of parks, New York; all bids uniform.

650 tons, Bronx market alterations, Turner Construction Co., general contractor.

598 tons, Hampton street, viaduct, St. Louis; bids Oct. 16.

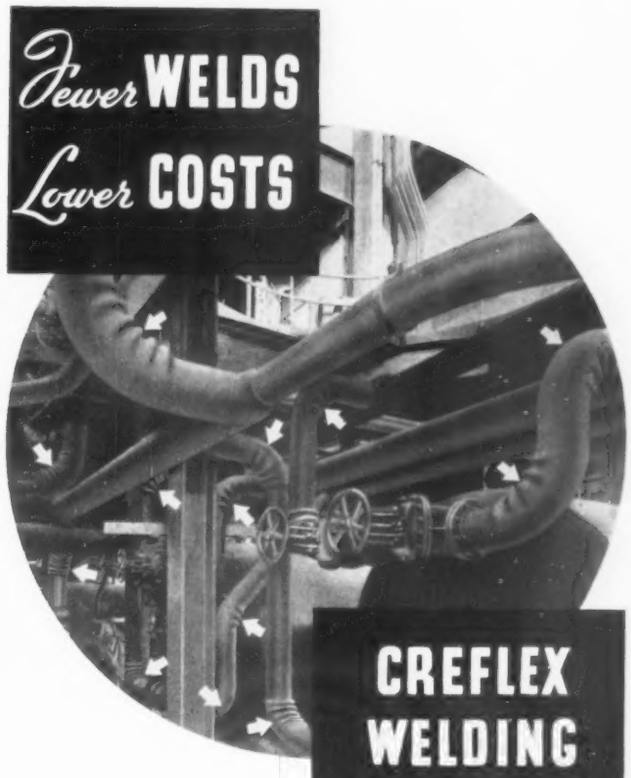
475 tons, highway, route 10, section 5, Salem street to Succasunna, Morris county, New Jersey; bids Oct. 15 to state highway commission, Trenton, N. J.

364 tons, Kentucky state highway projects; bids Oct. 5 and 8.

300 tons, auditorium, San Jose, Calif.; new bids Oct. 8.

220 tons, jail, Bordentown, N. J.

147 tons, Vasona dam and canal, San



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Jose, Calif., for Santa Clara county; bids Oct. 2.

Strip Steel

Strip Prices, Page 51

Pittsburgh—Strip mill producers are now soliciting fourth-quarter business at unchanged price of 2.60c, base Pittsburgh. Hot-rolled strip is steady at 1.85c, base Pittsburgh. A district mill was able to schedule its 8 and 12-inch mills through last week on an accumulation of small orders. Included in steel requirements for the Tygart river reservoir dam near Grafton, W. Va., are 12 tons of nickel-copper alloy strip. General contractor bids will be opened Oct. 16.

Cleveland—Improved demand featured the market last week, buying coming principally from automobile partsmakers. General Motors units recently placed some orders for parts for new models. Miscellaneous manufacturing requirements also showed a fairly good increase, including orders from makers of household utilities and agricultural implements. The price situation is steadier since a Detroit mill withdrew its reduction of $5 a ton of cold rolled strip. A competitive interest is reported to have threatened to cut the market $10 a ton unless the price was withdrawn.

Chicago—Automotive orders for strip steel are relatively light and producers look for only small lots until possibly late October. Specifications from miscellaneous users show little change. With future requirements somewhat uncertain and price advances precluded during that period, there is little incentive to order for the next three months' requirements.

New York—Strip steel sellers see little change in volume as compared with a week ago, although for the month just closed there has perhaps been a shade increase over the preceding month. Sentiment with regard to prices is a little better, particularly in view of the fact that the recent threat of a $5 cut in cold strip failed to develop. Hot strip is 2.18c and cold strip 2.93c, New York.

Philadelphia—Having survived the recent threat of a $5 reduction, the strip market appeared the strongest in some time. Tonnage has improved somewhat and there is a disposition among some to believe that a test for the present, at least, has been met. Hot strip is 1.85c, Pittsburgh, or 2.14c, Philadelphia, and cold strip 2.60c, Pittsburgh, or 2.89c, Philadelphia.

Boston—Industrial consumers of cold rolled strip are buying lightly, but the total volume shows some improvement. Stocks held by consumers generally are believed to be moderate. Prices are unchanged.

Wire

Wire Prices, Page 51

Pittsburgh—Merchant and manufacturing wire products demand is slightly better, although the uncertainties in some sections on less-carload charges have been disturbing. The market remains $2.60, Pittsburgh, for standard wire nails, 2.30c, for plain wire, and $63.00 per base column, for woven wire fencing. Bids were opened Sept. 28 by the state department of property and supplies, Harrisburg, Pa., on 2000 feet of ⅝-inch, and 2000 feet of ½-inch wire cable.

Cleveland—Demand for manufacturers' wire increased during the week, some substantial orders having been booked here after several weeks of quiet market conditions. This is for early delivery, little contracting being done for the fourth quarter. Consumers' stocks have practically disappeared, and additional buying is expected shortly.

Chicago—September showed gains in wire sales and shipments but a fairly large portion of this is ascribed to buying in anticipation of extra changes effective this month. The outlook is moderately favorable, however, with prospective improvement in needs of the automotive industry as well as of miscellaneous consumers of manufacturers' wire expected to develop soon. While there is some hope that farm buying of various wire products will result from funds received in connection with the government program for curtailment of crop and livestock raising, such betterment has yet to appear in any marked volume. Fourth quarter contracting is light.

Boston—Improvement in wire demand has not been general, but in certain directions spots buying has been heavier. Mill operations continue curtailed. Consumers are showing little interest in the fourth quarter. Plain bright wire is 2.40c, Worcester, to the manufacturing trade.

Philadelphia — Seasonal building repairs are reflected in improved de-

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mand for nails, although in the South, notably in North Carolina, domestic producers are having to meet German competition. A general line of wire products is showing only mild improvement.

Tin Plate

Tin Plate Prices, Page 50

Pittsburgh—A slight expansion in operations places the average for the tin plate industry fractionally above 45 per cent. The leading interest last week advanced a few points to 45 per cent, and moderate improvements in the plants of certain of the independents accounted for strength to the rate. Follansbee Bros. Co. resumed operations in its tin mills last week for at least a two weeks' run. Aside from the bulk of present buying which is coming from canmakers, users of tin mill specialties are more active. The tin plate market is steady at $5.25 per base box, with black sheets, 2.75c, Pittsburgh, for tin mill sizes.

New York — Tin plate specifications are lighter. Prices are steady.

Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 51

Fourth quarter contracting for bolts and nuts is slow, despite the recent announcement of lower prices for that period. In some quarters there is a disposition to await the establishment of the new market of 70, 10 and 10 off on bolts and nuts before making forward commitments.

Wrought washers remain quoted at 6.00 to 6.25 off list, Pittsburgh, Chicago or Philadelphia. Although there is some business going at the discount of 6.00 off, the majority of buyers are able to obtain 6.25 off list. No change has been made in large structural rivets at 2.90c, Pittsburgh or Cleveland, or in small rivets at 70-5 off list.

Cold Finished

Cold Finished Prices, Page 54

Pittsburgh — Buying of both carbon and alloy cold-drawn bars has shown marked improvement recently, from the low points of early August. Demand is coming chiefly from the general manufacturing trade, although there is some volume originating from the automotive field. Settlement of the textile strike has cleared the outlook for textile machinery manufacturers, who in turn, are themselves large users of cold drawn steels. The market is quoted steady at 2.10c, Pittsburgh, but there is practically no fourth-quarter buying. Cold drawn alloy bars remain at 2.95c, Pittsburgh.

Semifinished

Semifinished Prices, Page 51

Reopening of two small nonintegrated pipe mills in the Pittsburgh district provided some activity in the market for skelp. In addition, sheet bars are in better demand from both the integrated and nonintegrated rollers of tin plate and sheets. Only slight gains have been recorded in billets and wire rods. The price situation is steady, and billets are quoted $27, Pittsburgh; sheet bars, $28; and wire rods, $38 per ton.

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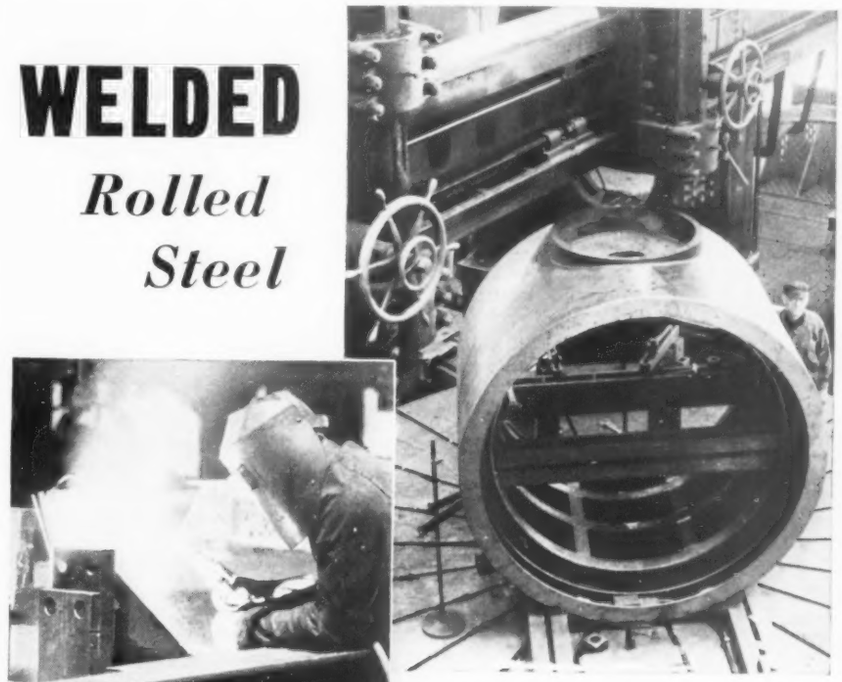

Above: 69" telescope frame built up of rolled steel, on 18' vertical boring mill. *Left:* welding yaw winch chassis.

•

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Pig Iron

Pig Iron, Prices, Page 52

Pittsburgh—General contractor bids to be opened Oct. 16 on the Tygart river reservoir dam near Grafton, W. Va., will require installation of 190,000 pounds of iron castings and 162,000 pounds of cast iron safety treads. Last week, H. P. Gazzam Machine Co., Pittsburgh, booked an order for 32,450 pounds of corrosion-resisting cast iron for the Pittsburgh federal engineers. Munson-McCairns Heating & Foundry Co., Pittsburgh, bid low on manhole covers recently for the city. Prices are steady.

Chicago—Further improvement is noted in pig iron shipments with the September movement showing a gain of around 20 per cent over August. Sales are increasing slowly in keeping with a similar upturn in foundry operations. While changes in foundry schedules during the past several weeks have been small, a more substantial pick-up is seen for October with automotive and farm implement foundries expected to be busier soon.

Cleveland—Shipments increased last week as some third quarter contracts were completed. The movement for the month from lake merchant furnaces was approximately 25 per cent larger than the total in August. Sellers begin the fourth quarter with practically no contracts for the period, and with current purchases limited to carload lots.

Boston—Small-lot sales are slightly improved. The larger consumers are not buying and few show interest in full fourth quarter requirements. Lower storage charges on imported iron here have been proposed by the New England Freight association—55 cents per gross ton for storage on open ground, the charge including switching from vessels, unloading, reloading into cars and the first month's storage; also 12 cents per gross ton per month for shipments stored in cars.

New York—Pig iron sales are scarcely maintaining the slight improvement of a week ago. Carlot orders continue the rule and in number there seems to be little change.

Philadelphia—Although the tonnage is still light, pig iron sellers report orders more numerous.

Buffalo—The quarter just ended is comparable to the dull period early in 1933, so far as producers of pig iron here are concerned. Practically no business is under contract for fourth quarter shipment.

Cincinnati—The pig iron market here is dull with the melt little changed. Some third quarter contracts were written but the tonnage involved was not great.

Birmingham, Ala.—Pig iron buying continues in small volume and for immediate needs. Stocks in blast furnace yards are heavy.

St. Louis—While fourth quarter buying of pig iron is still being held in abeyance, spot ordering has picked up materially and shipments show marked improvement over earlier in the month.

Toronto, Ont.—Merchant pig iron sales show little change from the preceding two or three weeks. Melters continue to take supplies on a reduced basis. It is reported that the Port Hope Sanitaryware Mfg. Co. recently placed an order for 500 tons of foundry iron, the largest order closed in over a year.

Scrap

Scrap Prices, Page 53

Pittsburgh—A moderate improvement in scrap shipments in this district was noted in the past week, with the lifting of shipping suspensions by at least two independent mills. Prices are firmer.

One of the largest scrap deals in the Pittsburgh district in recent months came to light last week when shipments got under way from the plant of the Vulcan Detinning Co., Neville Island, Pittsburgh, covering hydraulic compressed sheet scrap to the Johnstown, Pa., plant of Bethlehem Steel Co. It is reported that 10,000 tons of hydraulic compressed sheets were sold at a sliding scale price based on the market of No. 1 heavy melting steel at Pittsburgh. Shipments at the rate of four carloads a day, or 200 tons, were proceeding last week.

Cleveland—New business in iron and steel scrap still is confined to small lots, with shipments being made largely to points outside this immediate city. Some heavy steel and also blast furnace material continues to move into the Youngstown district from here, and there appears some prospect of a price advance to attract more material for the covering of old orders.

Chicago—Heavy melting steel has developed sudden strength due to activities of brokers in attempting to cover recent orders. Bids have ranged up to $9 and the market may be quoted 50 cents higher at $8.50 to $9, recently. Foundries are more active Foundries are more active in scrap buying. Available scrap is limited in quality grades although railroad lists continue to appear regularly.

Boston—Export demand for heavy melting steel scrap continues active. Several thousand tons of new business has been booked, including two boat shipments, one to Japan. Domestic demand is lacking, New England consumers even having reduced delivered quotations, and as a result

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are taking in little scrap. Prices paid for export are $7 and $6, dock, for No. 1 and No. 2 melting steel, respectively.

New York — Heavy melting steel prices for export are unchanged at $8 and $6.50, barge, with practically all activity centered in buying for water shipment. Domestic demand is sluggish. Some scrap from the interior is being bought for export, coming through the barge canal.

Philadelphia—While quiet, a certain element of strength is noted in scrap. No. 1 steel is still available at the minimum of $9.50, delivered, but it is not being freely offered at that figure, with the spread continuing at $9.50 to $10. No. 2 is also steady at $8 to $8.50 delivered, and all other leading grades, including cast, are holding.

For export, No. 1 steel is quoted at $9.25, dock, and No. 2 steel at $8.25. Statement last week that there had been a 50-cent reduction was in error, as one leading exporter has continued to hold to those prices.

Buffalo — Large consumers are not buying and principal melters claim to have on hand sufficient material to last for 60 days or longer.

Detroit—The market is decidedly weaker, but no notable changes have been made in iron and steel scrap prices.

Cincinnati — Scrap market remains listless. Lowered bids, compared to recent months, for scrap on several railroad lists caused withdrawal of considerable tonnage by railroads.

St. Louis—The market is a little more active. Dealers look for additional buying during the next two or three weeks. Inquiries have become more frequent and involve larger tonnages than earlier in the month. An east side mill purchased 2000 tons of heavy melting steel, the largest transaction in several weeks. Three thousand tons of rails by the Missouri Pacific were withdrawn.

Birmingham, Ala. — Continued dullness is reported in scrap iron and steel, with prices weak. Heavy melting steel is moving slowly.

Metallurgical Coke

Coke Prices, Page 54

Foundry and furnace coke producers have decided to affirm the present Connellsville, Pa. price of $5.85 for furnace coke, and $4.60 for the foundry grade until at least Jan. 1. Both of these prices are for spot shipment. Although some premium foundry coke is reported sold from time to time in small lots at $5.35, Connellsville ovens, the general market is $5.10 to quantity users.

At Chicago September coke shipments were off slightly from August. The September price of $8.50, ovens, for outside delivery and $9.25, delivered Chicago, also are being continued for October.

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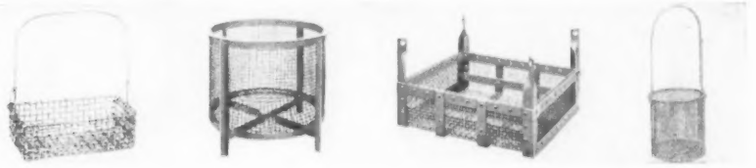

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Warehouse

Warehouse Prices, Page 54

Pittsburgh—Moderate buying of warehouse products continued through last week, and September volume was 10 to 15 per cent better than August's in this district.

Cleveland — Better business is reported in the last half of September than in the first half by some warehouse interests here, several good orders for bars and cold rolled steel lifting their tonnage for the month to date over that of the comparable period in August. The improvement is not general, others noting less volume than last month.

Chicago—Sales are fairly steady. Bolt and nut prices have been reduced through an increase in discounts in keeping with recent changes by manufacturers. New quantity extras have been adopted for large rivets.

New York—Warehouse volume has improved with September sales of most jobbers below the preceding month, due to slow recovery after Labor day. Prices are steady.

Philadelphia — While September shows a decline in jobbing demand, as compared with August, buying over the past week has improved. Jobbers, consequently, are hopeful of a more active market in October. Prices on bolts and nuts are expected to reflect the recent reduction at the mills.

Detroit—Shipments of warehouse steel in September were materially ahead of the August total in this district. A larger share of the going business is coming from makers of jigs and machinery fixtures.

Cincinnati—Tonnage of steel from warehouse during September was somewhat heavier than in August. Sales are small individually.

St. Louis—Further slight improvement, seasonal in character, is reported by warehouses. Certain sections of the manufacturing trade show broadening tendencies, with some pick up in sheets and wire. Furniture manufacturers have moderately increased their purchases, and packers also are accounting for somewhat larger tonnages.

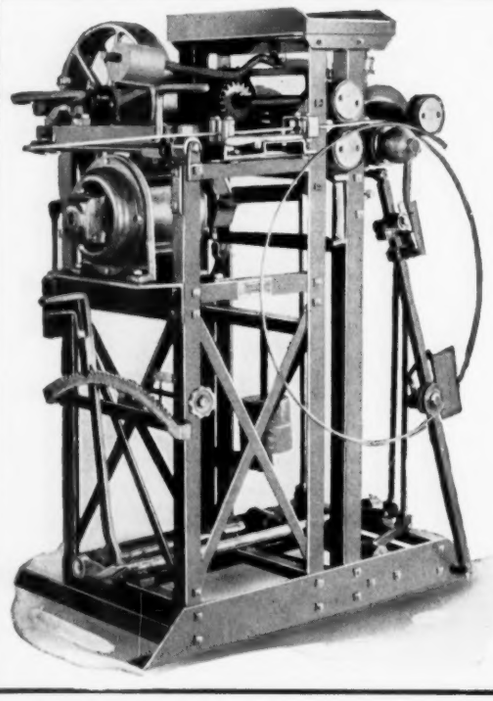
Ferroalloys

Ferroalloy Prices, Page 52

Fourth quarter contracts for ferromanganese have been practically completed, the price being unchanged at $85, duty paid, seaboard. Delivered in Pittsburgh, ferromanganese 78-82 per cent, is $89.79 per ton. Specifications continue fairly good, and contrasted to a year ago little imported material is appearing. Other ferroalloys are moving at an unchanged rate and prices are steady.

Quicksilver

New York—Quicksilver prices are steady at $75 a virgin flask of 76 pounds in small lots, and $74 a flask in round lots. The market is quiet.



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Nonferrous Metals

Nonferrous Metal Prices, Page 52, 53

New York — Easiness in lead and zinc prices and the statement by E. T. Stannard, president, Kennecott Copper Corp., that copper producers and W. A. Janssen, deputy code administrator, had agreed on an adjustment of sales allocations to meet the drop in domestic consumption, assuring the continuation of the sales plan of the code and also a continuation of the present stability of the market, were chief developments last week.

Copper — Primary producers have suspended sales allocations from Sept. 15 to Oct. 31 and have waived their rights to give notice as to the suspended allocations under the sales plan. Observers expect increased buying in the near future. Prices held at 9.00c, delivered Connecticut.

Lead — Despite release of favorable statistics showing a cut in refined lead stocks during August, prices dropped $1 a ton on Tuesday to 3.45c, East St. Louis, and 3.60c, New York. A fair spurt in buying followed.

Zinc — Prime western prices have slipped to a basis of 3.95c, East St. Louis, for spot through December but consumers generally took only light tonnages.

Tin—Steelmaking operations have improved and tin plate making is holding to about 45 per cent, but demand for Straits continued to lag. Most daily sales were under 100 tons. Output quotas of leading world producers will be cut from a base of 50 per cent to 40 per cent through recent action by the international tin committee. Spot Straits tin continued to be quoted at a premium over futures toward the end of the week.

Antimony — Prices have been slightly easy on actual business done which has been confined to small lots for the most part.

Aluminum — Prices were unchanged in a quiet market.

Equipment

Cleveland—Equipment markets in this territory are showing some life after a prolonged period of dullness. Miscellaneous varieties of machinery are being bought, and fair demand is being registered for industrial heating furnaces and furnace parts. Government work is enabling many shops to keep in operation, necessitating occasional replacement of equipment.

Pittsburgh—New buying of promise in steel mill equipment has

dwindled and pending inquiries of size have not yet been closed. In the latter category, the strip mills for both Carnegie Steel Co. and Great Lakes Steel Corp. fall, and in the case of the Carnegie mill, cost tabulations are still going ahead. Releases of steel mill rolls have practically ceased and although rollmakers have fair orders on their books, they are unable to proceed in the absence of steel mills' specifications. Ford Motor Co. recently awarded contracts for three new air-type melting furnaces, with orders being shared by two Pittsburgh equipment manufacturing companies.

Chicago — Equipment markets here continue spotty but with occasional improvement noted in sales of small types of machinery and tools. Demand for small tools is improving gradually but activity in machine tools remains slow. Inquiries for the latter show occasional gains, these coming principally from miscellaneous users. Inquiries for proposed machine tool purchases for the Rock Island, Ill., arsenal have yet to be received although this plant is expected to participate in the government appropriation for arsenel machinery. No buying of consequences by railroads is looked for prior to settlement of the freight rate increase proposal and few purchases have been made the past several months.

Steel in Europe

Foreign Steel Prices, Page 54

London—(*By Cable*)—Iron and steel markets appear generally quieter, but inquiries are substantial, justifying optimistic expectations. Pig iron stocks are relatively low. Prices are firm. Merchant structural and special steel are in best demand. Continental competition has reasserted itself. Scottish trade is fairly busy. Demand for tin plate is steady. Continent reports fair activities, especially in Japanese market. South American and Canadian markets are reviving.

Pacific Coast

Pacific Coast Prices, Page 51, 52, 54

San Francisco—(*By Air Mail*)—The cast iron pipe market is the most active, bids having been opened on close to 7500 tons for San Francisco. The movement of iron and steel generally has fallen off, although a heavy tonnage of bars, plates and shapes are scheduled to be placed within the next few weeks.

It is understood that the Los Angeles harbor commission, Los Angeles, will use 471 tons of 90 and 128-pound rail instead of new material on a project just awarded. Unnamed interests took 250 tons for crane runways for the Boulder dam in Nevada. Pending business in rails and railway equipment is confined to unimportant inquiries.

Reinforcing bar awards for the week aggregated a little over 700 tons, although awards to date this year exceed the total for the same period a year ago by 39,000 tons, and already are larger than for any other year in the history of the Pacific coast.

The largest award was placed with Graham Bros. and called for 200 tons for a plant for the Santa Cruz Cement Co., at Long Beach, Calif. Unnamed interests took 107 tons for a school at Norwalk, Calif., and 100 tons for bridges in Johnson county, Wyo., for the state. Bids have been opened on 600 tons for a high school in South San Francisco and new bids will be opened on Oct. 8 for 300 tons for an auditorium at San Jose, Calif. Plans have been completed for the Taylor Park dam, Gunnison, Colo., involving 325 tons of bars, plates and shapes.

Unnamed interests took 100 tons of plates for tunnel forms for the metropolitan water districts, Los Angeles and 200 tons for four land booster cars for Fort Peck dam in Montana. Chicago Bridge & Iron Works was low on 120 tons for a 250,000-gallon tank and tower for Brawley, Calif. Bids have been opened on 290 tons of 22-inch pipe for Los Angeles and on 300 tons of 14-inch, 12-gage pipe for Big Timber, Mont.

Shape awards totaled 1000 tons and included 500 tons for crane runways for Boulder dam, Nevada, placed with Shaw-Box Co., Muskegon, Wis., and 224 tons for a state bridge in Sander county, Montana. New bids will be opened on Oct. 8 for 700 tons for an auditorium at San Jose, Calif.

Public Projects Dominate

Seattle — New specifications for iron and steel materials are coming out in the Pacific Northwest but they are all in connection with public projects. Private enterprise is lagging. No outstanding awards were made this week. The market continues firm, prices well maintained.

Oct. 18 is the date set for receiving bids by bureau of reclamation for a cantilever type, 550 feet, bridge at Coulee dam over the Columbia river. Four reinforced piers and two ends, each 200 feet, are involved. About 1600 tons of shapes will be required.

General contractors at Coulee have

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asked bids for a construction bridge calling for 900 tons of structurals. Heavy tonnages of steel items will also be purchased soon for this project, bids for some already having been submitted. A model town, with 700 dwellings and many other structures, will be built and it is planned to heat all buildings with electricity.

United States engineer, Portland, Oreg., announces Commercial Iron Works, Portland, is low bidder at $15,530 for two anchor barges involving 70 tons welded plates and bars.

Babcock & Wilcox Co. is reported low for 750 tons of plates for the Pine View, Utah, dam. Bids are in for a bridge in Sanders county, Montana, calling for 224 tons shapes. Oregon will receive bids Oct. 1 and 11 for 20 projects including a 60-foot steel span in Baker county, an underpass in Blackamas county and concrete viaducts in Multnomah and Coos counties.

Seattle has opened bids for 440 tons of reinforcing bars for the Diablo power project, 55,000 feet galvanized wrought iron pipe and 75 gross tons of 140-pound girder rails. Reclamation bureau, Denver, is calling bids Oct. 15 for 18 motor driven, turbine pumping units. Extensive repairs to the steamer ORSEGO at Seattle involve 26 new plates.

Helena, Mont., is considering tenders for 2500 feet of 6-inch cast iron pipe and fittings. Unnamed interests have taken 393 tons of cast iron pipe for Culbertson, Mont., and 209 tons for Moab, Utah, city council.

Oriental demand for scrap materials continues but an increase in trans-Pacific freights from $2.50 to $3.50 without higher c.i.f. offers is retarding closing of new business. Good cupola size material is quoted as high as $9 and shippers expect buyers to raise their offers.

Construction and Enterprise

New York

COLD SPRING, N. Y.—An unstated manufacturer of steel products has purchased a factory here through Ethel V. B. Covert, secretary and treasurer of the Putnam county real estate board, Cold Spring.

NEW YORK—O-Neh-Da Vineyard & Distillery Co., care of Financial Security Corp., 521 Fifth avenue, is considering reconditioning its plant at Conesus, N. Y.

NEW YORK—Fletcher Machinery Corp. has been formed to manufacture machinery and parts by G. H. Halbert, West New Brighton, Staten Island, N. Y., and Joseph Montgomery, 571 Dewey avenue, Crantwood, N. J.

New Jersey

KEARNY, N. J.—Seacoast Refining Co. recently suffered damages by fire, caused by an explosion in the redistilling plant.

NEWARK, N. J.—Wiener Body Co. Inc., 245 Raymond boulevard, has been formed to take over a former company of the same name at that address and manufacture automobile bodies and do repairs, by Max L. Wiener and associates.

Ohio

CHILLICOTHE, O.—Mead Corp.'s activated carbon or char plant, including considerable machinery, recently was damaged by fire.

CLEVELAND—Columbia Metal Stamping Co., 11900 Harvard avenue, has leased a plant on East 116th street where its capacity will be expanded.

CLEVELAND—Assets of Myers Mfg. Corp., 2915 Detroit avenue, will be sold at public auction Oct. 1, including machinery and equipment. Gus Rosen, commercial auctioneer, 1608-9 Guardian Title building, Cleveland.

EAST LIVERPOOL, O.—City will take vote Nov. 6 on proposed purchase or construction of municipal electric power distribution system. Shelton J. Overdorf, city auditor.

LISBON, O.—National Brass & Copper Co. Inc. has been organized by Pittsburgh interests and has taken over plant and property of the same name at Lisbon and will operate it.

Michigan

BESSEMER, MICH.—City has been granted federal funds for construction of sewage plant and sewer system to cost $91,000. Suhr, Berryman, Peterson & Suhr Inc., 130 North Wells street, Chicago, engineer.

BIG RAPIDS, MICH.—Plans are progressing for construction this fall and winter of a municipal filtration plant, pumping station and standpipe.

CHARLEVOIX, MICH.—City clerk is taking figures for a sewage plant and sewer construction work, estimated to cost $75,000. Bids will be due Oct. 8.

DETROIT—Krueger Wayne Tool Co. has been organized to deal in machinery, by H. Glen Bixby, 1200 Oakman boulevard, Detroit.

DETROIT—Auto Steel Co., 1643 Union Guardian building, has been incorporated to deal in steel, by Leo H. Marks, 8545 Second boulevard, Detroit.

DETROIT—General Pattern Works Inc. has been formed by Harry C. Bates, R. F. D. No. 2, Warren, Mich., to operate a pattern shop business.

DETROIT—Giffels & Vallet Inc., 606 Marquette building, is preparing plans for a steel mill addition, 270 x 920 feet, also for a factory and power house, 40 x 150 feet, to be erected at Dearborn for the Ford Motor Co.

DETROIT—Scotten-Dillon Co. 4085 West Fort street, manufacturer of tobacco, is erecting a 2-story factory building, 140 x 180 feet, at its plant. Donaldson & Meier, 1601 Washington Boulevard building, Detroit, are architects.

DETROIT—Giffels & Vallet Inc., 606 Marquette building, engineer, is preparing preliminary plans for alterations to the Parfet building, Port Huron, Mich., for conversion into a modern brewing plant for the Basshead Ale & Brewing Co. It is estimated that $50,000 will be spent for the building, and $100,000 for equipment.

DETROIT—Briggs Mfg. Co., 11631 Mack avenue, is planning a second plant expansion to cost from $500,000 to $1,000,000. Increased business, both in automobile body building and drawn metal plumbing fixtures, is credited with making extensive improvements necessary. Installation of six large presses is probable.

ESCANABA, MICH.—Escanaba, Iron Mountain & Western railroad, subsidiary of the Chicago & North Western railroad, is planning to repair and improve its two docks at Escanaba, after federal loan of $3,500,000, recently allotted for new ore dock, was rescinded.

GRAND RAPIDS, MICH.—Kent Refining Co., oil refiner, will remove its refinery to a new site three miles east of Grand Rapids, where additional units will be erected, to bring capacity to 1000 barrels per day. Mt. Pleasant crude oil will be used.

GREENVILLE, MICH.—Francis Engineering Co., Saginaw, Mich., is making a survey for proposed light and power plant improvements for city of Greenville.

MUSKEGON, MICH.—Muskegon has received contract from federal government officials for the proposed construction of a $500,000 sewage treatment plant to be financed with PWA funds.

PORT HURON, MICH.—Lakeside Brewery Co., recently incorporated with $275,000, has acquired the property of the old Port Huron Brewery Co., and will begin remodeling the buildings soon.

Illinois

CHICAGO—Acme Steel Co., 2840 Archer avenue, will build 2-story addition to its plant at Riverdale, Ill., 99 x 575 feet, to cost about $200,000.

CHICAGO—Dupage Boiler Works Inc., 11 South LaSalle street, has been incorporated by Clyde L. Savage, C. J. Savage and John W. Bissell, to deal in iron and steel. Correspondent: Bissell & Bissell, suite 1025, Roanoke building, 11 South LaSalle street.

CHICAGO—Electromatic Corp., 714 North Cicero avenue, has been incorporated to manufacture, install and service refrigeration and air conditioning equipment, and automatic temperature controlling regulators, by Charles Toussaint, Elmer M. Toussaint and Fred H. Carlson. Correspondent: Ivron C. Thorpe, 19 south LaSalle street.

CHICAGO—General Heaters Mfg. Co., 1132 East Sixty-fourth street, has been incorporated to manufacture hot water heaters and equipment, hot water pumps, oil heaters, tank heaters, etc., by William Hand, Mary Hand, and Julia Hanson. Correspondent: Solomon Lett-

vin, Suite 1611, Chicago Temple building, 77 West Washington street.

CHICAGO—Gordon Kluberg Inc., 1738 West Van Buren street, has been incorporated to engage in manufacturing and installation of sheet metal specialties, by William Kluberg, Theodore Christianson and Margaret Gordon. Correspondent: Harry C. Hansen, Geneva, Ill.

EVANSVILLE, ILL.—City is having plans prepared by Russell & Axon, engineers, 4903 Delmar boulevard, St. Louis, for construction of a gas plant and distribution system, to cost about $89,000, including equipment.

Alabama

ANNISTON, ALA.—Kilby Car & Foundry Co. has purchased an electrical steel furnace for its plant. Arrangements are reported to have been made for hydroelectric power to operate the new furnace.

MOBILE, ALA.—Roux Crate & Lumber Co., Tampa, Fla., E. T. Roux, president, and Keysville Lumber Co., Keysville, Fla., C. G. Armstrong, president, will establish plant to be operated jointly for manufacture of crates and hampers. Factory formerly occupied by Benson-Beckman Paint Co. has been purchased for use as main factory. Plant will represent investment of about $250,000.

Florida

LAKE CITY, FLA.—City, A. J. Rountree, mayor, will receive bids Oct. 5 for constructing improvements and extensions to municipal water supply system.

MIAMI, FLA.—Miami Machinery Corp. has been formed by Elmore Daniels and Rudolph Isom.

PENSACOLA, FLA.—Spearman Brewing Co., Guy M. Spearman, president, is planning to erect a brewery on the east side of Barrancas avenue, to cost approximately $250,000.

TAMPA, FLA.—Peninsular Refining Co., L. H. McInrie, Tampa, plans constructing oil refinery, to cost about $300,000.

Georgia

MACON, GA.—City, Jesse Mitchell, chairman, has plans by Wiedeman & Singleton, engineers, Candler building, Atlanta, Ga., for filtration plant, to cost $60,000.

QUITMAN, GA.—J. W. Oglesby & Associates, Quitman, have plans by C. O. Herson and C. E. Drummon Jr., engineers, 101 Spring street building, Northwest, Atlanta, Ga., for erection of potato starch plant, including power plant.

Kentucky

ASHLAND, KY.—Ashland By-Product Coke Co. plans to build a river terminal at Ashland, consisting of a floating dock and conveyor system. The conveyor system will consist of a fixed structural steel transfer tower carrying two belt conveyors landward to a rail transfer tower.

DRAKESBORO, KY.—Town will receive bids Oct. 2 for construction of complete waterworks plant, including installation of pumps and tank and tower.

LOUISVILLE, KY.—Willow Brook Distillery Co. has been incorporated with $50,000 capital, by G. W. Weston and F. E. Murray.

LOUISVILLE, KY.—Cummins Distillery Corp., Walter C. Wagner, Breslis building, will soon call for bids for boilers, stokers, copper kettles, etc., for plant improvements at Atherton, Ky. H. G. Whittenberg, contractor, Louisville, Ky. Cost is estimated at $200,000.

MURRAY, KY.—City receives bids Oct. 19 for sewerage system and sewage disposal plant to cost about $65,000.

Maryland

BALTIMORE—Board of awards, Leon Small, water engineer, receives bids Oct. 3 for pumping equipment, etc., for Baltimore city hospitals.

HURLOCK, MD.—Commissioners of Hurlock, Roland V. Layton, mayor, will call for new bids for sewer system and disposal plant.

North Carolina

CAROLINA BEACH, N. C.—Norman L. Mintz, town clerk, 605 South Sixteenth street, Wilmington, N. C., receives bids Oct. 12 for constructing waterworks system, including deep well, deep well pump, pump house, 100,000-gallon steel tank erected on 100-foot tower, etc. J. L. Becton, Wilmington, N. C., engineer.

FAYETTEVILLE, N. C.—City will issue $26,000 public improvement bonds for light improvements. Bids will be called for soon.

NEW BERN, N. C.—City, Leo C. Scott, mayor, is planning to build a cannery, 50 x 200 feet.

Tennessee

MEMPHIS, TENN.—Fisher Body Corp., Detroit, has purchased Memphis plant of Kelsey Wheel Co., including land and buildings, but excluding machinery and equipment. A little later the company plans reconditioning and operating dry kilns.

West Virginia

HUNTINGTON, W. VA.—United States engineer will receive bids Oct. 3, circular 35-83, for return tube portable fire-box type boilers, 80-horsepower, length not to exceed 18 feet, and diameter about 56 inches.

Virginia

BURKESVILLE, VA.—C. E. Shore, mayor, opens bids Oct. 5 for construction of waterworks system, including installation of two deep well pumps and motors, 75,000-gallon steel tank on 100-foot tower, meters, fire equipment, etc. J. B. McCrary Engineering Corp., engineer, Atlanta, Ga.

CHARLOTTESVILLE, VA.—Corporation, care of Stuart Hamm, Charlottesville, Va., plans construction of distillery, to cost $100,000.

PORT ROYAL, VA.—Blue Ridge Distillers Inc., care of A. G. Weaver, Port Royal, Va., has acquired a site here and plans to construct a distillery, to cost approximately $100,000.

Missouri

ADRAIN, MO.—Arvie C. Bair, mayor, opens bids Oct. 8 for constructing complete waterworks system, consisting of two drilled wells and pumps, horizontal pump, 50,000-gallon water tower and 200 service connections and meters. E. T. Archer & Co., consulting engineer, New England building, Kansas City, Mo.

BOLIVAR, MO.—T. H. B. Dunnegan Jr., mayor, receives bids Oct. 9 for improvements to waterworks, including furnishing all material and labor and additions to distributing system, pipe lines, hydrants, valves, etc.; constructing 200,000-gallon water tower and furnishing totalizing meter. E. T. Archer & Co., consulting engineer, New England building, Kansas City, Mo.

FULTON, MO.—City will soon take bids for construction of gas plant and distribution system. J. Frank Harrison is city engineer. Russell & Axon, 4903 Delmar boulevard, St. Louis, are the constructing engineers. Estimated cost $98,500.

Arkansas

HOT SPRINGS, ARK.—City is having Black & Veatch, engineers, Kansas City, Mo., prepare plans for two disposal plants to cost approximately $300,000.

Oklahoma

BLACKWELL, OKLA.—City voted to give city commissioners authority to spend $101,000 in improving city's water supply, including erection of pump station.

Texas

CORPUS CHRISTI, TEX.—General American Tank & Terminal Co., 1221 East Forty-second street New York, has acquired additional ship terminals here, formerly owned by Pure Oil Co., and has purchased site adjoining Corpus Christi plant where it will erect plant, increasing capacity to 400,000 barrels.

ELKHART, TEX.—City, J. B. Parker, mayor, has loan and grant of $42,000 for waterworks and sewage system. Joe Rady, engineer, Majestic building, Fort Worth, Tex.

FREDERICKSBURG, TEX.—City, Edward Krauskopf, mayor, receives bids Oct. 11 for waterworks system and sewage disposal plant. Montgomery & Ward, Harvey-Snider building, Wichita Falls, Tex., engineers.

HANDLEY, TEX.—City has loan and grant of $150,000 approved by PWA for waterworks system.

HARLINGEN, TEX.—Cameron County Water Improvement District No. 19, Keith McCanse, president of board of directors, is making preparations for construction of an irrigation system, consisting of concrete main canal, pumping plant on the Rio Grande river and network of canals for distribution purposes. Two motor-driven 30-inch pumps will be installed.

HEARNE, TEX.—City, W. H. Ely mayor, opens bids Oct. 12 for waterworks improvements, including deep well, pumping equipment, and 150,000-gallon elevated storage tank. J. W. Beretta Inc., engineer, National Bank of Commerce building, San Antonio, Tex. PWA loan and grant of $25,000 has been approved.

LONGVIEW, TEX.—Longview Coco Cola Bottling Co. has plans by P. E. Zimmerman, Longview, Tex., for erecting a plant to cost about $20,000, including installation of modern equipment.

McKINNEY, TEX.—City, Joe E. Largent mayor, will soon call for bids for pump house and water improvements.

WHERE-TO-BUY

A classified list of advertisers according to products. ¶Index to advertisements gives page number of any advertiser.

ABRASIVES (Polishing)
Carborundum Co., The, Niagara Falls, N. Y.
Norton Co., Worcester, Mass.

ACCUMULATORS
Morgan Engineering Co., The, Alliance, O.

ACETYLENE
Linde Air Products Co., 30 E. 42nd St., New York City.

ACID-PROOF LININGS
Ceilcote, The Co., Rockefeller Bldg., Cleveland, O.

ACIDS (Pickling)
American Chemical Paint Co., Ambler, Pa.

AIR COMPRESSORS—See COMPRESSORS (Air)

AIR CONDITIONING EQUIPMENT
Sturtevant, B. F., Co. Hyde Park, Boston, Mass.

AIR PREHEATERS
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

ALLOYS—See FERROALLOYS

ANGLES, CHANNELS—See BEAMS, CHANNELS, ANGLES

ANGLE IRON BENDERS
Excelsior Tool & Machine Co., Ridge and Jefferson Aves., East St. Louis, Ill.

ANNEALING BOXES
Union Steel Casting Co. 62nd & Butler Sts., Pittsburgh, Pa.

ANODES (All Types)
The Udylite Co., 1615 E. Grand Blvd., Detroit, Mich.

AXLES
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 So. LaSalle St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Youngstown, O.
Standard Steel Works Co., Burnham, Pa.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.

BABBITT METAL
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

BANDS—See HOOPS AND BANDS

BANDS (Iron and Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 So. LaSalle St., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

BAR BENDERS
Kardong Bros., 346 Buchanan St., Minneapolis, Minn.

BARGES (Steel)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
McClintic-Marshall Corp., Bethlehem, Pa.

BARRELS (Plating)
The Udylite Co., 1615 E. Grand Blvd., Detroit, Mich.

BARS (Alloy)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 327 Carnegie Bldg, Pittsburgh, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Republic Steel Corp., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Timken Steel & Tube Co., Canton, O.

BARS (Concrete Reinforcing)
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. LaSalle, St., Chicago, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., Youngstown, O.

BARS (Iron)—See IRON (Bar)

BARS (Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Republic Steel Corp., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., Youngstown, O.

BEAMS, CHANNELS, ANGLES, ETC.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., Youngstown, O.

BEARINGS (Ball)
Bantam Ball Bearing Co., The South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
New Departure Mfg. Co., Bristol, Conn.
S K F Industries, Inc., Front St. & Erie Ave., Philadelphia, Pa.

BEARINGS (Bronze)
Shenango-Penn Mold Co., Dover, O.

BEARINGS (Journal)
Bantam Ball Bearing Co., The, South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt, Roller Bearing Co., P. O. Box 476, Newark, N. J.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
S K F Industries, Inc., Front St. & Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Roller)
Bantam Ball Bearing Co., The, South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Roller Bearing Co., P. O. Box 476, Newark, N. J.
S K F Industries, Inc., Front St. & Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Roll Neck)
Bantam Ball Bearing Co., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Roller Bearing Co., P. O. Box 476, Newark, N. J.
Ryerson, Jos. T. & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
S K F Industries, Inc., Front St. & Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., Canton, O.

BEARINGS (Thrust)
Bantam Ball Bearing Co., The, South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
S K F Industries, Inc., Front St. & Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BENDING AND STRAIGHTENING MACHINES
Kardong Bros., 346 Buchanan St., Minneapolis, Minn.
Morgan Engineering Co., The, Alliance, O.
Thomas Spacing Machine Co., Pittsburgh, Pa.

BENZOL AND TOLUOL RECOVERY PLANTS
Koppers Construction Co., 1438 Koppers Bldg., Pittsburgh.
Youngstown Sheet & Tube Co., Youngstown, O.

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BILLETS (Alloy and Carbon Steel)
Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., Newport, Ky.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. La Salle St., Chicago, Ill.
Republic Steel Corp., Youngstown, O.
Timken Steel & Tube Co., Canton, O.
Washburn Wire Co., Phillipsdale, R. I.

BILLETS (Forging)
Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., Newport, Ky.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. La Salle St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Republic Steel Corp., Youngstown, O.
Standard Steel Works, Co., Burnham, Pa.
Timken Steel & Tube Co., Canton, O.

BILLETS AND BLOOMS
Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. La Salle St., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Youngstown, O.
Standard Steel Works Co., Burnham, Pa.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.
Timken Steel & Tube Co., Canton, O.
Youngstown Sheet & Tube Co., Youngstown, O.

BLAST FURNACE SPECIALTIES
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.

BLAST FURNACES—See FURNACES (Blast)

BLOWERS
General Electric Co., Schenectady, N. Y.
Ingersoll-Rand Co., Phillipsburg, N. J.
Strong, Carlisle & Hammond Co., The, 1400 W. 3rd St., Cleveland, O.
Sturtevant, B. F., & Co., Hyde Park, Boston, Mass.

BOILER HEADS
Bethlehem Steel Co., Bethlehem, Pa.

BOILER TUBES—See TUBES (Boiler)

BOILERS
Murray Iron Works Co., Burlington, Iowa.

BOLT AND NUT MACHINERY
Landis Machine Co., Waynesboro, Pa.

BOLTS
Bethlehem Steel Co., Bethlehem, Pa.
Illinois Steel Co., 208 S. La Salle St., Chicago, Ill.
Jones & Laughlin Steel Co., Jones & Laughlin Bldg., Pittsburgh, Pa.
Oliver Iron & Steel Corp., S. 10th & Muriel Sts., Pittsburgh, Pa.

including drilling deep well, building pump house and extension of water mains. Koch & Fowler, engineers, 801 Central Bank building, Dallas, Tex.

WELLS, TEX.—City, J. H. Dubose, mayor, will probably release bids about Oct. 15 for waterworks including elevated tank and pump. Joe Rady, engineer, Majestic building, Fort Worth, Tex.

Wisconsin

ADAMS, WIS.—Robert Cramer, consulting engineer, 647 West Virginia street, Milwaukee, has been selected to prepare plans for the new $50,000 sewerage system and disposal plant. Oscar Hitt is city clerk.

MILWAUKEE—Wangerin Mfg. Co. is the name of the new Wisconsin corporation formed by John Bina, 1210 South Twenty-fifth street, Arthur B. Wangerin and A. J. Martin, to manufacture special machinery. Production plans have not been announced.

SUPERIOR, WIS.—Board of vocational education plans addition to manual training institute and alterations in existing building, costing about $25,000 with new equipment.

WAUSAU, WIS.—Wausau Paper Mills Co. will invest between $35,000 and $40,000 in adding more driers, suction rolls, a new power drive and a new back line drive, and lengthening the wire on its No. 3 110-inch Fourdrinier paper mill machine to improve product and tonnage.

Minnesota

BYRON, MINN.—William Moody, city clerk, will receive bids until Oct. 5 for municipal waterworks system, including 50,000-gallon steel tank and 100-foot steel tower and deep well. Druar & Milinowski, 830 Globe building, St. Paul, are engineers.

FAIRFAX, MINN.—City council is having G. M. Orr & Co., 408 Baker building, Minneapolis, prepare plans for municipal power plant to cost $60,000, including diesel engine generating equipment.

MINNEAPOLIS—Lewis Air Conditioners Inc., Carroll E. Lewis president, manufacturer of humidifying and air conditioning equipment, has leased 15,000 square feet of space in the factory of the McQuay Radiator Corp., 1600 West Broadway, where it will manufacture its own products.

MINNEAPOLIS—Fleischmann Malting Co., C. W. Johnson district manager, has awarded contract for construction of 26 new barley and malt storage tanks at its plant at Erie and Delaware street, Southeast, to cost $100,000. At its plant in northeast Minneapolis the company is enlarging its boiler plant and will add three 250-horsepower water tube boilers.

MINNEAPOLIS — Hanford Airlines, Arthur S. Hanford Jr. president, is moving its headquarters and operating offices from Sioux City, Iowa, to the Wold-Chamberlain municipal airport here, where two hangars leased by the air transport company will be completely remodeled to provide for a fully-equipped engine overhauling shop, ship maintenance department, radio shop and propeller and instrument shops.

ST. PAUL.—Drewry & Sons Co., bottler of carbonated beverages, 701 Drewry lane, has awarded contract for extensive alterations to its bottling plant.

Pacific Coast

ONTARIO, OREG.—City council will open bids Oct. 17 for construction of a filtration plant.

COULEE DAM, WASH. — United States reclamation bureau is seeking a site for a mill where plates can be fabricated into the proper size and shape for the Grand Coulee dam project.

Value of Finished Steel In 1933 Just Tops Billion

(*Concluded from Page 21*)

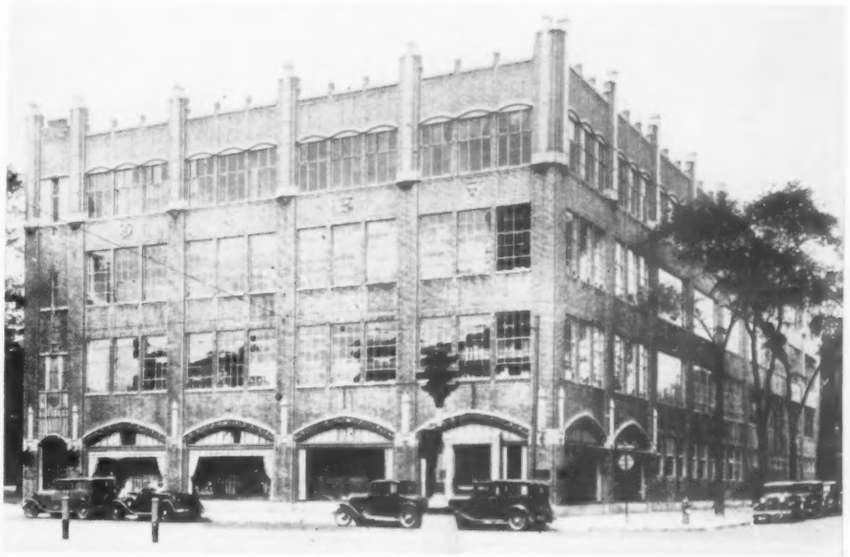
terplant transfer..	696,140	28,429,353
Produced and consumed, same wks.	71,400	.....
Axles, rolled or forged, for sale and for interplant transfer.....	54,578	2,788,392
Car and locomotive wheels, rolled or forged, for sale and interplant transfer..	69,288	6,486,221
Armor plate and ordnance, for sale.....	7,510	2,080,491
Sheet piling, plain, for sale and for interplant transfer.....	42,451	1,637,825
Rolled and forged iron and steel products, n. e. s.:		
For sale	143,478	15,367,546
Interplant transfers	44,976	2,329,414
Produced and consumed, same wks.	54,212	.....
Scrap iron and steel:		
For sale	687,199	6,991,501
Interplant transfers	343,753	3,263,656
Produced and consumed, same wks.	6,175,738	.....
Cinder and scale:		
For sale	173,167	386,466
Interplant transfers	535,514	882,355
Produced and consumed, same wks.	647,172	.....
Further manufactured products made in steel works and rolling mills from finished rolling mill and foundry products	.....	460,008,981

*In addition, 14,376 tons of steel castings, valued at $2,465,648, were produced in 1933 for sale by establishments classified in other industries, and 17,065 tons were reported as produced and consumed in the same works in further manufacture by establishments in the "Foundry and machine shop products not elsewhere classified" industry.

†Figures for this item include data for very small quantities (amounting to less than one-tenth of 1 per cent of the totals for 1933 and 1931) of hammered charcoal blooms, billets, etc., which cannot be shown separately without disclosing approximations of data for individual establishments.

‡Figures do not include data for pierced billets and blanks (for seamless pipes and tubes) produced and consumed in the same works, nor for rolled blooms and billets for forgings produced for sale, but do include data for a small quantity of pierced billets and blanks made for sale and for interplant transfer. Data for these products are included in respective items under "Semifinished rolled products."

Carboloy Occupies New Detroit Plant and Offices



CARBOLOY CO. INC., formerly at 2481 East Grand boulevard, Detroit, has moved its general offices, Detroit district office, and main manufacturing plant to new, larger quarters at 2985 East Jefferson avenue, where it will occupy two entire floors of a modern manufacturing and commercial building.

The new quarters, containing increased floor space approximately 86 per cent over the former quarters, have been equipped for a large, immediate increase in plant capacity on Carboloy standard and special tools and dies and contain reserve space for future expansion as required.

Particular attention has been given, in the new manufacturing setup, to facilities for producing special types of Carboloy tools such as reamers, counterborers, drills, milling cutters, etc., as a large increase in demand for these types of Carboloy tools has been felt during the past year.

Considerable new equipment has been purchased for this new plant which, it is felt by the Carboloy Co., will result not only in improved quality of work but also considerably faster service.

Carboloy Co. Inc., manufactures Carboloy cutting tools, abrasion and corrosion resistant tools and parts, drawing and extrusion dies and diamond impregnated truing tools and laps.

WHERE-TO-BUY

BOLTS—Con
Republic Steel Corp., Upson Nut Div. 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Jos. T., & Son, Inc. 16th and Rockwell Sts., Chicago, Ill.

BOXES (Annealing)
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Wilson, Lee, Engineering Co., 21349 Stratford Ave., Cleveland, O.

BOXES (Case Hardening)
Strong, Carlisle & Hammond Co., The, 1400 W. 3rd St., Cleveland, O.

BOXES (Open Hearth Charging)
Morgan Engineering Co., The, Alliance, O.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

BRAKES (Electric)
Clark, The, Controller Co., 1146 E. 152nd St., Cleveland, O.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

BRICK (Insulating)—See INSULATING BRICK

BRICK (Refractory)—See REFRACTORIES, CEMENT, DOLOMITE, etc.

BRICK (Silicon Carbide)
Carborundum Co., The, Perth Amboy, N. J.
Norton, Co., Worcester, Mass.

BRIDGE CRANES (Ore and Coal Handling)
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

BRIDGES, BUILDINGS, VIADUCTS, STACKS
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Belmont Iron Works, 22nd and Washington Ave., Philadelphia, Pa.
Blaw Knox Co., Farmers Bank Bldg., Pittsburgh, Pa.
McClintic-Marshall Corp., Bethlehem, Pa.
Ohio Structural Steel Co., The, Newton Falls, O.

BUCKETS (Clam Shell, Dragline, Grab, Single Line)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Blaw Knox Co., Farmers Bank Bldg., Pittsburgh, Pa.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

BUILDINGS (Steel)—See BRIDGES, ETC.

BURNERS (Acetylene)—See TORCHES AND BURNERS

BURNERS (Automatic)
Surface Combustion Co., 2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co., 21349 Stratford Ave. Cleveland, O.

BURNERS (Fuel, Oil, Gas, Combination)
Shunk Mfg. Co., Bucyrus, O.
Surface Combustion Co., 2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co., 21349 Stratford Ave., Cleveland, O.

BUSHINGS (Bronze)
Gifford Engine Co., Lansing, Mich.
Shenango-Penn Mold Co., Dover, O.

BUSHINGS (Steel)
Gifford Engine Co., Lansing, Mich.

BY-PRODUCT PLANTS
Koppers Construction Co., 1438 Koppers Bldg., Pittsburgh, Pa.

CADMIUM
The Udylite Co., 1615 E. Grand Blvd., Detroit, Mich.

CADMIUM PLATING PROCESS
The Udylite Co., 1615 E. Grand Blvd., Detroit, Mich.

CAR DUMPERS
Industrial Brownhoist Corp., Bay City, Mich.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

CARBIDE
Linde Air Products Co., 30 E. 42nd St., New York City.

CARD HOLDERS
Grammes, L. F., & Sons, Inc., Allentown, Pa.

CAR PULLERS and SPOTTERS
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CARS (Charging)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

CARS (Industrial and Mining)
Atlas Car & Mfg. Co., 1140 Ivanhoe Rd., Cleveland.
Bethlehem Steel Co., Bethlehem, Pa.

CARS (Scale)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.

CASTERS
Lansing Co., Lansing, Mich.

CASTINGS (Acid Resisting)
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Driver-Harris Co., Harrison, N. J.
International Nickel Co., Inc., 67 Wall St., New York City.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Shenango-Penn Mold Co., Dover, O.

CASTINGS (Alloy Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Pittsburgh Rolls Corp., 41st and Willow Sts., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Treadwell Engineering Co., Easton, Pa.
Union Steel Casting Co., 62nd & Butler Sts., Pittsburgh, Pa.
United Engineering & Fdry Co., First National Bank Bldg., Pittsburgh, Pa.

CASTINGS (Brass, Bronze, Copper, Aluminum)
Bethlehem Steel Co., Bethlehem, Pa.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Shenango-Penn Mold Co., Dover, O.

CASTINGS (Electric Steel)
West Steel Casting Co., 805 E. 70th St., Cleveland, O.

CASTINGS (Gray Iron)
Bethlehem Steel Co., Bethlehem, Pa.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Erie Foundry Co., Erie, Pa.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Murray Iron Works, Burlington, Iowa.
National Roll & Foundry Co., The, Avonmore, Pa.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.
Treadwell Engineering Co., Easton, Pa.

CASTINGS (Heat Resisting)
Driver-Harris Co., Harrison, N. J.

CASTINGS (Malleable)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Peoria Malleable Castings Co., Peoria, Ill.

CASTINGS (Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Mackintosh-Hemphill Co., 9th & Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1124, Pittsburgh, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Pittsburgh Rolls Corp., 41st and Willow Sts., Pittsburgh, Pa.
Standard Steel Works Co., Burnham, Pa.
Strong Steel Fdry. Co., 33 Norris St, Buffalo, N. Y.
Treadwell Engineering Co., Easton, Pa.
Union Steel Casting Co., 62nd & Butler Sts., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
West Steel Casting Co., 805 E. 70th St., Cleveland, O.

CASTINGS (Worm & Gear Bronze)
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.

CEMENT (High Temperature)
Botfield Refractories Co., Swanson and Clymer Sts., Philadelphia, Pa.
Carborundum Co., The, Perth Amboy, N. J.
Norton Company, Worcester, Mass.
Strong, Carlisle & Hammond Co., The, 1400 W. 3rd St., Cleveland, O.

CHAIN (Draw Bench)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CHAIN (Malleable)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CHAIN (Sprocket)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Diamond Chain & Mfg. Co., 455 Kentucky Ave., Indianapolis, Ind.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Peoria Malleable Castings Co., Peoria, Ill.

CHAIN (Steel-Finished Roller)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Diamond Chain & Mfg. Co., 455 Kentucky Ave., Indianapolis, Ind.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CHARGING MACHINES (Cupola)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.

CHARGING MACHINES (Open Hearth)
Morgan Engineering Co., The, Alliance, O.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

CHECKS (Metal)
Cunningham, M. E., Co., 107 E. Carson St., Pittsburgh, Pa.

CHIPPERS (Billet)
Bonnot Co., The, Canton, O.

CHROME ORE
Botfield Refractories Co., Swanson & Clymer Sts., Philadelphia, Pa.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia.

CHROMIUM METAL
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

CLEANING SPECIALTIES
American Chemical Paint Co., Ambler, Pa.

CLUTCHES (Magnetic)
Magnetic Mfg. Co., Dept. TL 650 So. 28th St., Milwaukee, Wis.

COAL AND COKE
Alan Wood Steel Co., Conshohocken, Pa.
Cleveland-Cliffs Iron Co., Union Trust Bldg., Cleveland, O.
Hanna Furnace Corp., The, Detroit, Mich.
Interlake Iron Corp., Union Trust Bldg., Cleveland, O.
Pickands, Mather & Co., Union Trust Bldg., Cleveland, O.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., Youngstown, O.

COAL, ORE AND ASH HANDLING MACHINERY
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Industrial Brownhoist Corp., Bay City, Mich.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

COKE—See COAL AND COKE

COKE OVEN MACHINERY
Atlas Car & Mfg. Co., 1140 Ivanhoe Rd., Cleveland.
Morgan Engineering Co., The, Alliance, O.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

COKE OVENS (By-Product)
Koppers Construction Co., 1438 Koppers Bldg., Pittsburgh.

COMBUSTION BULBS
Norton Company, Worcester, Mass.

COMPRESSORS (Air)
Curtis Pneumatic Machinery Co., 1996 Kienlen Ave., St. Louis, Mo.
General Electric Co., Schenectady, N. Y.
Ingersoll-Rand Co., Phillipsburg, N. J.
Worthington Pump & Machinery Corp., Harrison, N. J.

CONCRETE REINFORCING BARS—See BARS (Concrete Reinforcing)

CONDENSERS (Surface, Barometric, Multi-jet)
Ingersoll-Rand Co., Phillipsburg, N. J.
Worthington Pump & Machinery Corp., Harrison, N. J.

CONDUITS (Electric)
Steel & Tubes, Inc., 224 E. 121st St., Cleveland, O.
Youngstown Sheet & Tube Co., Youngstown, O.

CONTRACTORS—See ENGINEERS AND CONTRACTORS

CONTROLLERS (Electric)
Clark, The, Controller Co., 1146 E. 152nd St., Cleveland, O.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
General Electric Co., Schenectady, N. Y.

CONVEYOR BELTS (High and Low Temperature)
Wickwire Spencer Steel Co., 41 E. 42nd St., New York City.

CONVEYORS (Elevating & Conveying)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

COTTER PINS
Hindley Mfg. Co., Valley Falls, R. I.

COUPLINGS (Flexible)
Clark, The, Controller Co., 1146 E. 152nd St., Cleveland, O.
Diamond Chain & Mfg. Co., 455 Kentucky Ave., Indianapolis Ind.
General Electric Co., Schenectady, N. Y.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

COUPLINGS (Pipe)
Bethlehem Steel Co., Bethlehem, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Republic Steel Corp., Youngstown, O.
Youngstown Sheet & Tube Co., Youngstown, O.

WHERE-TO-BUY

CRANES, BRIDGE (Ore and Coal Handling)
Industrial Brownhoist Corp., Bay City, Mich.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

CRANES (Charging)
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., Alliance, O.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

CRANES (Creeper, Erection)
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CRANES (Electric)
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., Alliance, O.
Shaw-Box Crane & Hoist Co., Inc., 406 Broadway, Muskegon, Mich.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

CRANES (Gantry)
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Morgan Engineering Co., The, Alliance, O.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

CRANES (Gasoline and Diesel)
Industrial Brownhoist Corp., Bay City, Mich.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CRANES (Hand)
Curtis Pneumatic Machinery Co., 1996 Kienlen Ave., St. Louis, Mo.
Industrial Brownhoist Corp., Bay City, Mich.
Shaw-Box Crane & Hoist Co., Inc., 406 Broadway, Muskegon, Mich.

CRANES (Jib)
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.

CRANES (Locomotive)
Harnischfeger Corp., 411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CUTTING AND WELDING—See WELDING

CUTTING OILS—See Oils (Cutting)

CYLINDERS (Pressure)
National Tube Co., Frick Bldg., Pittsburgh, Pa.

DEOXIDIZERS
Titanium Alloy Mfg. Co., Hyde Park Blvd., Niagara Falls, N. Y.
Vanadium Corp. of America, 120 Broadway, New York City.

DIE BLOCKS
Bethlehem Steel Co., Bethlehem, Pa.
Bissett Steel Co., 945 E. 67th St., Cleveland, O.
Standard Steel Works Co., Burnham, Pa.

DIE HEADS
Landis Machine Co., Waynesboro, Pa.

DIES (Punching, Stamping, Blanking)
Alliance Mfg. Co., Alliance, O.
Columbus Die, Tool & Mach. Co., The 955 Cleveland Ave., Columbus, O.

DIES (Steel, Embossing)
Cunningham, M. E., Co. 107 E. Carson St., Pittsburgh, Pa.

DOLOMITE—FLUX AND REFRACTORIES
Basic Dolomite, Inc., 845 Hanna Bldg., Cleveland, O.

DOOR OPENERS
Schoelkopf Mfg. Co., Madison, Wis.

DRILL RODS—See RODS (Drill)

DRILLING MACHINES (Multiple, Heavy Duty)
Thomas Spacing Machine Co., Pittsburgh, Pa.

DRILLING MACHINES (Radial)
Thomas Spacing Machine Co., Pittsburgh, Pa.

DRIVES (Chain)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Diamond Chain & Mfg. Co., 455 Kentucky Ave., Indianapolis, Ind.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

DRIVES (Cut Herringbone Gears)
Lewis Foundry & Machine Co., P. O. Box 1591, Pittsburgh, Pa.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Mackintosh-Hemphill Co., 9th & Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1124, Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

ECONOMIC SERVICE
Brookmire, Inc., 551 Fifth Ave., New York, N. Y.

EJECTORS (Steam, for Pickling Tanks)
Dietzel Lead Burning Co., Keystone Bldg., Pittsburgh, Pa.

ELECTRIC HEATING ELEMENTS
Driver-Harris Co., Harrison, N. J.

ELECTRIC WELDING—See WELDING

ELECTRICAL EQUIPMENT
General Electric Co., Schenectady, N. Y.

ELEVATING AND CONVEYING MACHINERY—See CONVEYORS

EMBLEMS
Grammes, L. F. & Sons, Inc., Allentown, Pa.

ENGINEERS AND CONTRACTORS
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.
Wean Engineering Co., Warren, O.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

ENGINEERS (Consulting)
Perin Engineering Co., Inc., 535 Fifth Ave., New York City.
Wean Engineering Co., Warren, O.

ENGINEERS, CONSULTING (By-Product Coke Oven & Gas Plants)
Koppers Construction Co., 1438 Koppers Bldg., Pittsburgh.

ENGINEERS, CONSULTING (Open Hearth)
Buell, Wm. C., Jr., P. O. Box 282, Cleveland, O.

ENGINES (Gas, Oil)
Ingersoll-Rand Co., Phillipsburg, N. J.
Worthington Pump & Machinery Corp., Harrison, N. J.

ENGINES (Steam)
Murray Iron Works, Burlington, Iowa.

EQUIPMENT (Rebuilt)
McCabe & Sheeran Machinery Corp., 50 Church St., New York City.
Ritterbush & Co., Inc., 30 Church St., New York City.

FACING MACHINES (Structural)
Thomas Spacing Machine Co., Pittsburgh, Pa.

FANS (Exhaust Ventilating)
Propellair, Inc., Springfield, O.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

FANS (Portable)
Perkins, B. F., & Son Co., Holyoke, Mass.

FERROALLOYS
Cleveland-Cliffs Iron Co., Union Trust Bldg., Cleveland, O.
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
International Nickel Co., Inc., 67 Wall St., New York City.
Ohio Ferro Alloys Corp., Citizens Bldg., Canton, O.
Pittsburgh Metallurgical Co., College and Highland Ave., Niagara Falls, N. Y.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Titanium Alloy Mfg. Co., Hyde Park Blvd., Niagara Falls, N. Y.
Vanadium Corp. of America, 120 Broadway, New York City.

FERROCARBON (Titanium)
Titanium Alloy Mfg. Co., Hyde Park Blvd., Niagara Falls, N. Y.

FERROCHROME
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Pittsburgh Metallurgical Co., College and Highland Ave., Niagara Falls, N. Y.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Vanadium Corp. of America, 120 Broadway, New York City.

FERROMANGANESE
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Pittsburgh Metallurgical Co., College and Highland Ave., Niagara Falls, N. Y.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

FERROPHOSPHORUS
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

FERROSILICON
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Pittsburgh Metallurgical Co., College and Highland Ave., Niagara Falls, N. Y.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Vanadium Corp. of America, 120 Broadway, New York City.

FERROSILICON ALUMINUM
Vanadium Corp. of America, 120 Broadway, New York City.

FERROTITANIUM
Vanadium Corp. of America, 120 Broadway, New York City.

FERROTUNGSTEN
Electro Metallurgical Sales Corp., 30 East 42nd St., New York City.

FERROVANADIUM
Vanadium Corp. of America, 120 Broadway, New York City.

FLOORING (Steel)
Alan Wood Steel Co., Conshohocken, Pa.
Blaw Knox Co., Farmers Bank Bldg., Pittsburgh, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

FLUOR SPAR
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

FORGING BILLETS—See BILLETS (Forging)

FORGING MACHINERY
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.

FORGINGS (Drop)
Bethlehem Steel Co., Bethlehem, Pa.

FORGINGS (Iron and Steel)
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1124, Pittsburgh, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Oliver Iron & Steel Corp., S. 10th and Muriel Sts., Pittsburgh, Pa.
Standard Steel Works Co., Burnham, Pa.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.

FORGINGS (Upset)
Bethlehem Steel Co., Bethlehem, Pa.

FROGS AND SWITCHES
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.

FURNACE INSULATION—See INSULATION

FURNACES (Blast)
McClintic-Marshall Corp., Bethlehem, Pa.

FURNACES (Electric Heating)
Electric Furnace Co., The, Wilson St., Salem, O.
General Electric Co., Schenectady, N. Y.
Holcroft & Co., 6545 Epworth Blvd., Detroit, Mich.
Mahr Mfg. Co., 1729 22nd St., Minneapolis, Minn.
Pittsburgh Lectromelt Furnace Corp. P. O. Box 1125, Pittsburgh, Pa.
Strong, Carlisle & Hammond Co., 1400 W. 3rd St., Cleveland, O.

FURNACES (Electric Melting)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
General Electric Co., Schenectady, N. Y.

FURNACES (Forging)
Electric Furnace Co., The, Salem, O.
Holcroft & Co., 6545 Epworth Blvd., Detroit, Mich.
Mahr Mfg. Co., 1729 22nd St., Minneapolis, Minn.
Surface Combustion Co., 2375 Dorr St., Toledo, O.

FURNACES (Gas or Oil)
Holcroft & Co., 6545 Epworth Blvd., Detroit, Mich.
Mahr Mfg. Co., 1729 22nd St., Minneapolis, Minn.
Strong, Carlisle & Hammond Co., The, 1400 W. 3rd St., Cleveland, O.
Surface Combustion Co., 2375 Dorr St., Toledo, O.

FURNACES (Open-Hearth)
Criswell, James, Co., Keenan Bldg., Pittsburgh, Pa.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

FURNACES (Recuperative)
Electric Furnace Co., The, Wilson St., Salem, O.
Holcroft & Co., 6545 Epworth Blvd., Detroit, Mich.
Surface Combustion Co., 2375 Dorr St., Toledo, O.

FURNACES (Sheet and Tin Mill)
Electric Furnace Co., The, Salem, O.
Surface Combustion Co., 2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co., 21349 Stratford Ave., Cleveland, O.

FURNACES (Steel Mill)
Criswell, James, Co., Keenan Bldg., Pittsburgh, Pa.
Electric Furnace Co., The, Wilson St., Salem, O.
Flinn & Dreffein Co., 308 W. Washington St., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Holcroft & Co., 6545 Epworth Blvd., Detroit, Mich.
Surface Combustion Co., 2375 Dorr St., Toledo, O.
Wilson, Lee, Engineering Co., 21349 Stratford Ave., Cleveland, O.

FURNACES (Steel Treating, Annealing and Case Hardening)
Carborundum Co., The, Perth Amboy, N. J.
Electric Furnace Co., The, Wilson St., Salem, O.
General Electric Co., Schenectady, N. Y.
Holcroft & Co., 6545 Epworth Blvd., Detroit, Mich.
Mahr Mfg. Co., 1729 22nd St., Minneapolis, Minn.
Strong, Carlisle & Hammond Co., 1400 W. 3rd St., Cleveland, O.
Surface Combustion Co., 2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co., 21349 Stratford Ave., Cleveland, O.

WHERE-TO-BUY

GALVANIZING
Enterprise Galvanizing Co., 2507 E. Cumberland St., Philadelphia, Pa.

GALVANIZING PLANTS FOR SHEETS
Erie Foundry Co., Erie, Pa.
Wean Engineering Co., Warren, O.

GAS HOLDERS
McClintic-Marshall Corp., Bethlehem, Pa.

GAS PRODUCER PLANTS
Flinn & Dreffein Co., 308 W. Washington St., Chicago.
Koppers Construction Co., 1438 Koppers Bldg., Pittsburgh.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

GAS RECOVERY COKE OVEN AND GAS PLANTS
Koppers Construction Co., 1438 Koppers Bldg., Pittsburgh.

GAUGES (Indicating and Recording)
General Electric Co., Schenectady, N. Y.

GEAR BLANKS
Bethlehem Steel Co., Bethlehem, Pa.
Lukens Steel Co., Coatesville, Pa.
Standard Steel Works Co., Burnham, Pa.

GEARS AND GEAR CUTTING
General Electric Co., Schenectady, N. Y.
Lewis Foundry & Machine Co., P. O. Box 1591, Pittsburgh, Pa.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Mackintosh-Hemphill Co., 9th & Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1124, Pittsburgh, Pa.
Burlington, Iowa.
Murray Iron Works Burlington, Iowa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

GENERATING SETS
General Electric Co., Schenectady, N. Y.

GENERATORS (Electric)
General Electric Co., Schenectady, N. Y.
Lincoln Electric Co., The, Cleveland, O., Dept. 20-10.

GENERATORS (Plating)
The Udylite Co., 1615 E. Grand Blvd., Detroit, Mich.

GRATING (Steel)
Blaw Knox Co., Farmers Bank Bldg., Pittsburgh, Pa.

GREASE (Lubricating)—See LUBRICANTS (Industrial)

GRINDING MACHINES (Plain and Universal)
Norton Co., Worcester, Mass.

GRINDING MACHINES (Roll)
Mesta Machine Co., P. O. Box 1124, Pittsburgh, Pa.
Norton Co., Worcester, Mass.

GRINDING MACHINES (Swing Frame)
Excelsior Tool & Machine Co., Ridge and Jefferson Aves., East St. Louis, Ill.

GRINDING MACHINES (Tool and Cutter)
Norton Co., Worcester, Mass.

GRINDING WHEELS
Carborundum Co., The, Niagara Falls, N. Y.
Macklin Company, Jackson, Mich.
Norton Co., Worcester, Mass.

GUARDS (Belt, Machine, Window)
Buffalo Wire Works Co., 437 Terrace, Buffalo, N. Y.

HACK SAW BLADES
Armstrong-Blum Mfg. Co., 339 N. Francisco St., Chicago, Ill.

HAMMERS (Chipping, Riveting, Calking)
Ingersoll-Rand Co., Phillipsburg, N. J.

HAMMERS (Drop)
Chambersburg Engineering Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., Alliance, O.

HAMMERS (Steam)
Chambersburg Engineering Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., Alliance, O.

HANGERS (Shaft)
Fafnir Bearing Co., New Britain, Conn.
Hyatt Roller Bearing Co., P. O. Box 476, Newark, N. J.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
S K F Industries, Inc., Front St. & Erie Ave., Philadelphia, Pa.

HARDWARE SPECIALTIES
Peoria Malleable Castings Co., Peoria, Ill.

HEADS, STEEL (Spun and Dished)
Lukens Steel Co., Coatesville, Pa.

HEAT RESISTING PRODUCTS (Electric)
Driver-Harris Co., Harrison, N. J.

HOISTS (Air)
Curtis Pneumatic Machinery Co., 1996 Kienlen Ave., St. Louis, Mo.

HOISTS (Chain)
Chisholm-Moore Hoist Corp., Tonowanda, N. Y.

HOISTS (Electric)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Chisholm-Moore Hoist Corp., Tonawanda, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Shaw-Box Crane & Hoist Co., Inc., 406 Broadway, Muskegon, Mich.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

HOISTS (Monorail)
Chisholm-Moore Hoist Corp., Tonawanda, N. Y.
Shaw-Box Crane & Hoist Co., Inc., 406 Broadway, Muskegon, Mich.

HOISTS (Pneumatic)
Ingersoll-Rand Co., Phillipsburg, Pa.

HOOPS AND BANDS
American Steel & Wire Co., 208 S. LaSalle St., Chicago, Ill.
Carnegie, Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Eyerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.
West Leechburg Steel Co., Union Bank Bldg., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., Youngstown, O.

HYDRAULIC MACHINERY
Bethlehem Steel Co., Bethlehem, Pa.
Chambersburg Engineering Co., Chambersburg, Pa.
Morgan Engineering Co., Alliance, O.

HYDRAULIC PRESSES—See PRESSES (Hydraulic)

INGOT MOLDS
Bethlehem Steel Co., Bethlehem, Pa.
Shenango-Penn Mold Co., Oliver Bldg., Pittsburgh, Pa.
Valley Mould & Iron Co., Hubbard, O.

INGOT PIPE ELIMINATORS
Alpha-Lux Co., Inc., 192 Front St., New York, N. Y.

INHIBITORS
Grasselli Chemical Co., Guardian Bldg., Cleveland, O.

INSTRUMENTS (Electric Indicating and Recording)
General Electric Co., Schenectady, N. Y.

INSULATION (Furnace, Boiler Settings, Ovens, Steam Pipe, etc.)
Armstrong Cork & Insulation Co., Lancaster, Pa.

INSULATING BRICK
Armstrong Cork & Insulation Co., Lancaster, Pa.
Botfield Refractories Co., Swanson and Clymer Sts., Philadelphia, Pa.

INSULATING BLOCK
Armstrong Cork & Insulation Co., Lancaster, Pa.

INSULATING POWDER AND CEMENT
Armstrong Cork & Insulation Co., Lancaster, Pa.

IRON (Bar)
Bethlehem Steel Co., Bethlehem, Pa.
Burden Iron Co., Troy, N. Y.
Ryerson, Jos. T., & Son., Inc., 16th and Rockwell Sts., Chicago, Ill.
Youngstown Sheet & Tube Co., Youngstown, O.

IRON ORE
Alan Wood Steel Co., Conshohocken, Pa.
Cleveland-Cliffs Iron Co., Union Trust Bldg., Cleveland, O.
Hanna Furnace Corp., The, Detroit, Mich.
Interlake Iron Corp., Union Trust Bldg., Cleveland, O.
Pickands, Mather & Co., Union Trust Bldg., Cleveland, O.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.

JIGS AND FIXTURES
Columbus Die, Tool & Mach. Co., The 955 Cleveland Ave., Columbus, O.

KILNS
Holcroft & Co., 6545 Epworth Blvd., Detroit, Mich.

LABELS (Metal)
Grammes, L. F., & Sons, Inc., Allentown, Pa.

LABORATORY WARE
Norton Company, Worcester, Mass

LARRIES (Coal)
Atlas Car & Mfg. Co., The, 1140 Ivahoe Rd., Cleveland, O.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

LATHES (Roll Turning)
Lewis Fdry. & Mach. Co., P. O. Box 1591, Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th & Bingham Sts., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

LEAD POTS
Driver-Harris Co., Harrison, N. J.

LEAD WORK
Dietzel Lead Burning Co., Keystone Bldg., Pittsburgh, Pa.

LEVELING MACHINES
Erie Foundry Co., Erie, Pa.
McKay Machine Co., Youngstown, O.
Wean Engineering Co., Warren, O.

LIFTING MAGNETS—See MAGNETS (Lifting)

LINERS (Pump and Cylinder)
Shenango-Penn Mold Co., Dover, O.

LOCOMOTIVE CRANES—See CRANES (Locomotive)

LOCOMOTIVES (Electric)
Atlas Car & Mfg. Co., 1140 Ivanhoe Rd., Cleveland, O
General Electric Co., Schenectady, N. Y.

LOCOMOTIVES (Gas-Electric)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
General Electric Co., Schenectady, N. Y.

LOCOMOTIVES (Oil-Electric)
Ingersoll-Rand Co., Phillipsburg, N. J.
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.

LOCOMOTIVES (Storage Battery)
Atlas Car & Mfg. Co., 1140 Ivanhoe Rd., Cleveland, O.
General Electric Co., Schenectady, N. Y.

LUBRICANTS (Industrial)
Gulf Refining Co., 3800 Gulf Bldg., Pittsburgh, Pa.
Sun Oil Co., 1608 Walnut St., Philadelphia, Pa.

MACHINE WORK
Lewis Foundry & Machine Co., P. O. Box 1591, Pittsburgh, Pa.
Morgan Engineering Co., Alliance, O.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

MACHINERY (Special)
Atlas Car Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Columbus Die, Tool & Mach. Co., The 955 Cleveland Ave., Columbus, O.
Lewas Fdry. & Mach. Co., P. O. Box 1591, Pittsburgh, Pa.
Morgan Engineering Co., Alliance, O.
National Roll & Fdry. Co., The, Avonmore, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Shuster, The F. B., Co., New Haven, Conn.
Thomas Spacing Machine Co., Pittsburgh, Pa.
Treadwell Engineering Co., Easton, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

MAGNESIA (Electrically Fused)
Norton Company, Worcester, Mass.

MAGNETIC SEPARATORS—See SEPARATORS

MAGNETS (Lifting)
Cutler-Hammer Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Magnetic Mfg. Co., Dept. TL, 650 So. 28th St., Milwaukee, Wis.

MANGANESE METALS
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

MANGANESE ORE
Samuel, Frank, Co., Inc., Harrison Bldg., Philadelphia, Pa.

MANIPULATORS
Morgan Engineering Co., The, Alliance, O.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

MARKING DEVICES
Cunningham, M. E., Co., 107 E. Carson St., Pittsburgh, Pa.

METAL (Perforated)—See PERFORATED METAL

METAL CLEANERS
American Chemical Paint Co., Ambler, Pa.
The Udylite Co., 1615 E. Grand Blvd., Detroit, Mich.

METAL SPECIALTIES AND PARTS—See STAMPINGS

METAL STAMPINGS—See STAMPINGS

METALS (Nonferrous)
International Nickel Co., Inc., 67 Wall St., New York City.
Titanium Alloy Mfg. Co., Hyde Park Blvd., Niagara Falls, N. Y.

MILLS (Blooming, Universal, Plate, Sheet, Tin, Bar, Strip, Etc.)—See ROLLING MILL EQUIPMENT

MOLDS (Ingot)—See INGOT MOLDS

MOLYBDENUM
Climax Molybdenum Co., 295 Madison Ave., New York City.
Vanadium Corp. of America, 120 Broadway, New York City.

MONEL METAL (All Commercial Forms)
International Nickel Co., Inc., 67 Wall St., New York City.

MOTORS (Electric)
Fairbanks, Morse & Co., 900 So. Wabash Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The Cleveland, O., Dept. 20-10.
Sturtevant, B. F. Co., Hyde Park, Boston, Mass.

MUCK BAR
Bethlehem Steel Co., Bethlehem, Pa.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

NAILS
Bethlehem Steel Co., Bethlehem, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Youngstown Sheet & Tube Co., The, Youngstown, O.

WHERE-TO-BUY

NAILS (Coated and Galvanized)
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Wickwire Spencer Steel Co., 41 E. 42nd St., New York City.

NAME PLATES
Grammes, L. F., & Sons, Inc., Allentown, Pa.

NICKEL (All Commercial Forms)
International Nickel Co., Inc., 67 Wall St., New York City.

NICKEL (Shot)
International Nickel Co., Inc., 67 Wall St., New York City.

NICKEL SILVER
Seymour Mfg. Co., Seymour, Conn.

NICKEL-CHROMIUM (Shot)
Driver-Harris Co., Harrison, N. J.

NICKEL STEEL (Cold Drawn)
Bethlehem Steel Co., Bethlehem, Pa.
Union Drawn Steel Co., Massillon, O.

NUTS
Bethlehem Steel Co., Bethlehem, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Oliver Iron & Steel Corp., S. 10th and Muriel Sts., Pittsburgh, Pa.
Republic Steel Corp., Upson Nut Div., 1912 Scranton Rd. Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

OILS (Cutting)
Gulf Refining Co., 3800 Gulf Bldg., Pittsburgh, Pa.
Sun Oil Co., 1608 Walnut St., Philadelphia, Pa.

OILS (Lubricating)—See LUBRICANTS (Industrial)

OIL RETAINERS
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.

OPEN-HEARTH FURNACES—See FURNACES (Open-Hearth)

OVENS (Coke, By-Product Recovery)
Koppers Construction Co., 1438 Koppers Bldg., Pittsburgh, Pa.

OVENS (Core and Mold)
Holcroft & Co., 6545 Epworth Blvd., Detroit, Mich.

OXY-ACETYLENE WELDING AND CUTTING—See WELDING

OXYGEN IN CYLINDERS
Linde Air Products Co., 30 E. 42nd St., New York City.

PERFORATED METAL
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.
Wickwire Spencer Steel Co., 41 E. 42nd St., New York City.

PHOSPHOR BRONZE
Seymour Mfg. Co., Seymour, Conn.

PICKLING COMPOUND
American Chemical Paint Co., Ambler, Pa.
Grasselli Chemical Co., Guardian Bldg., Cleveland, O.

PICKLING EQUIPMENT
Buffalo Wire Works Co., 437 Terrace, Buffalo, N. Y.
International Nickel Co., Inc., 67 Wall St., New York City.

PICKLING MACHINERY
Erie Foundry Co., Erie, Pa.
Lewis Foundry & Machine Co., P. O. Box 1591, Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1124, Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

PICKLING TANK LININGS
Ceilcote, The, Co., Rockefeller Bldg., Cleveland, O.

PICKLING TANKS—See TANKS (Pickling)

PIG IRON
Alan Wood Steel Co., Conshohocken, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Brooke, E. & G., Iron Co., Birdsboro, Pa.
Cleveland-Cliffs Iron Co., Union Trust Bldg., Cleveland, O.
Hanna Furnace Corp., The, Detroit, Mich.
Interlake Iron Corp., Union Trust Bldg., Cleveland, O.
Pickands, Mather & Co., Union Trust Bldg., Cleveland, O.
Republic Steel Corp., Youngstown, O.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.

PILING (Iron and Steel)
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

PINIONS (Mill)
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

PIPE (Brass, Bronze, Copper)
Shenango-Penn Mold Co., Dover, O.

PIPE (Steel)
American Rolling Mill Co., Middletown, O.
Bethlehem Steel Co., Bethlehem, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Republic Steel Corp., Youngstown, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

PIPE BENDING
Pittsburgh Piping & Equip. Co. 43rd St. and A. V. R. R., Pittsburgh, Pa.

PIPE CUTTING AND THREADING MACHINERY
Landis Machine Co., Waynesboro, Pa.
Treadwell Engineering Co., Easton, Pa.

PIPE ELIMINATORS
Alpha-Lux Co., Inc., 192 Front St., New York City.

PIPE FITTINGS
Pittsburgh Piping & Equip. Co., 43rd St. and A. V. R. R., Pittsburgh, Pa.

PIPE FITTINGS (Stainless Steel)
Pittsburgh Piping & Equipment Co., 43rd St. and A. V. R. R., Pittsburgh, Pa.

PIPE LINES (Riveted and Welded)
McClintic-Marshall Corp., Bethlehem, Pa.

PIPE MILL MACHINERY
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

PIPE STRAIGHTENING MACHINERY
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.
Treadwell Engineering Co., Easton, Pa.
United Engineering & Fdry Co., First Nat'l Bank Bldg., Pittsburgh, Pa.

PIPING CONTRACTORS
Pittsburgh Piping & Equip. Co., 43rd St. and A. V. R. R., Pittsburgh, Pa.

PLATE CASTORS
Hyatt Roller Bearing Co., P. O. Box 476, Newark, N. J.

PLATES (Blue Annealed)
Lukens Steel Co., Coatesville, Pa.

PLATES (Extra Wide, Extra Heavy)
Lukens Steel Co., Coatesville, Pa.

PLATES (Nickel Clad)
Lukens Steel Co., Coatesville, Pa.

PLATES (Sheared or Universal)
Alan Wood Steel Co., Conshohocken, Pa.
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Frick Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Granite City Steel Co., Granite City, Ill.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Lukens Steel Co., Coatesville, Pa.
Republic Steel Corp., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

PLATES (Steel—Floor)—See FLOORING (Steel)

PLATES (Terne and Tin)—See TIN PLATE

PLATING EQUIPMENT
The Udylite Co., 1615 E. Grand Blvd., Detroit, Mich.

POLE LINE HARDWARE
Oliver Iron & Steel Corp., S. 10th and Muriel Sts., Pittsburgh, Pa.

POLES (Tubular Steel)
National Tube Co., Frick Bldg., Pittsburgh, Pa.

POLISHING MACHINERY (Tube & Bar)
Medart, The, Co., 3500 de Kalb St., St. Louis, Mo.

POLISHING MACHINES, AUTOMATIC (Stainless Steel)
Excelsior Tool & Machine Co., Ridge and Jefferson Aves., East St. Louis, Ill.

POTS (Melting)
Strong, Carlisle & Hammond Co., The, 1400 W. 3rd St., Cleveland, O.

PRESSES
Erie Foundry Co., Erie, Pa.

PRESSES (Forging)
Erie Foundry Co., Erie, Pa.
Mesta Machine Co., P. O. Box 1124, Pittsburgh, Pa.
Morgan Engineering Co., Alliance, O.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

PRESSES (Hydraulic)
Chambersburg Engineering Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Mesta Machine Co., P. O. Box 1124, Pittsburgh.
Morgan Engineering Co., Alliance, O.

PRESSES (Welding)—See WELDERS

PRODUCER GAS SYSTEMS—See GAS PRODUCER PLANTS

PUG MILLS (For Blast Furnaces and Sintering Plants)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.

PULLEYS (Magnetic)
Magnetic Mfg. Co., Dept. TL 650 So. 28th St., Milwaukee, Wis.

PUMPS
Mesta Machine Co., P. O. Box 1124, Pittsburgh, Pa.

PUMPS (Centrifugal)
Ingersoll-Rand Co., Phillipsburg, N. J.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUNCHING AND SHEARING MACHINERY
Chambersburg Engineering Co., Chambersburg, Pa.
Lewis Foundry & Machine Co., P. O. Box 1591, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Thomas Spacing Machine Co., Pittsburgh, Pa.
United Engineering & Fdry. Co., First Nat'l Bank Bldg., Pittsburgh, Pa.

PYROMETERS
Strong, Carlisle & Hammond Co., The, 1400 W. 3rd St., Cleveland, O.

PYROMETER TUBES
Norton Company, Worcester, Mass.

RAIL BREAKERS
National Roll & Foundry Co., The, Avonmore, Pa.
United Engineering & Fdry. Co., First Nat'l Bank Bldg., Pittsburgh, Pa.

RAILS (Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. La Salle St., Chicago, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron and Railroad Co., Brown Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

REDUCTION GEARS
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Sturtevant, B. F., Co. Hyde Park, Boston, Mass.

REFRACTORIES (Castable)
Botfield Refractories Co., Swanson & Clymer Sts., Philadelphia, Pa.

REFRACTORIES (Chrome & Magnesite)
Botfield Refractories Co., Swanson & Clymer Sts., Philadelphia, Pa.

REFRACTORIES (Dolomite)
Basic Dolomite, Inc., 845 Hanna Bldg., Cleveland, O.

REFRACTORIES (Fire Clay)
Botfield Refractories Co., Swanson & Clymer Sts., Philadelphia, Pa.
Eureka Fire Brick Co., 1015 House Bldg., Pittsburgh, Pa.
Strong, Carlisle & Hammond Co., 1400 W. 3rd St., Cleveland, O.

REFRACTORIES (Silicon Carbide)
Carborundum Co., The, Perth Amboy, N. J.,
Norton Co., Worcester, Mass.

REINFORCEMENT FABRIC (Electric Welded)
Wickwire Spencer Steel Co., 41 E. 42nd St., New York City.

RESISTORS (Edgewound)
Clark, The, Controller Co., 1146 E. 152nd St., Cleveland, O.

RHEOSTATS (Plating)
The Udylite Co., 1615 E. Grand Blvd., Detroit, Mich.

RIVETING MACHINERY
Chambersburg Engineering Co., Chambersburg, Pa.
Shuster, F. B., Co., The, New Haven, Conn.

RIVETS
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Oliver Iron & Steel Co., S. 10th and Muriel Sts., Pittsburgh, Pa.
Progressive Mfg. Co., Torrington, Conn.
Republic Steel Corp., Upson Nut Div. 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

RODS (Drill)
Kidd Drawn Steel Co., Aliquippa, Pa.
Pittsburgh Tool Steel Wire Co., Monaca, Pa.

RODS (Rounds, Flats and Shapes)
Bethlehem Steel Co., Bethlehem, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Timken Steel & Tube Co., Canton, O.
Washburn Wire Co., Phillipsdale, R. I.
Youngstown Sheet & Tube Co., Youngstown, O.

RODS (Welding)—See WELDING RODS

RODS (Wire)—See WIRE PRODUCTS

WHERE-TO-BUY

ROLLING MILL BEARINGS
Bantam Ball Bearing Co., The, South Bend, Ind.
Hyatt Roller Bearing Co., P. O. Box 476, Newark, N. J.
S K F Industries, Inc., Front St. & Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

ROLLING MILL EQUIPMENT
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Fdry. & Mach. Co., P. O. Box 1591, Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th & Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1124 Pittsburgh, Pa.
Morgan Engineering Co., Alliance, O.
National Roll & Foundry Co., The, Avonmore, Pa.
Treadwell Engineering Co., Easton, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Wean Engineering Co., Warren, Ohio.

ROLLS (Sand and Chilled)
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Foundry & Machine Co., P. O. Box 1591, Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th & Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1124, Pittsburgh, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Pittsburgh Rolls Corp., 41st and Willow Sts., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

ROLLS (Steel and Iron)
Bethlehem Steel Co., Bethlehem, Pa.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Lewis Foundry & Machine Co., P. O. Box 1591, Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th & Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1124, Pittsburgh, Pa.
Midvale Co., The Nicetown, Philadelphia, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Pittsburgh Rolls Corp., 41st and Willow Sts., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

ROOFING AND SIDING (Corrugated and Plain)
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Frick Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago.
Newport Rolling Mill Co., The, Newport, Ky.
Parkersburg, The, Iron & Steel Co., Parkersburg, W. Va.
Republic Steel Corp., Youngstown, O.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., Youngstown, O.

RUST PROOFING PROCESS
The Udylite Co., 1615 E. Grand Blvd., Detroit, Mich.

SAFE ENDS (Boiler Tube)
National Tube Co., Frick Bldg., Pittsburgh, Pa.

SAFETY DEVICES (Electric)
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

SANDBLAST ABRASIVE (Shot and Grit)
Pittsburgh Crushed Steel Co., 61st and A. V. R. R., Pittsburgh, Pa.

SAND CONVEYING AND HANDLING MACHINERY
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

SAWS (HOT AND COLD)
Morgan Engineering Co., The, Alliance, O.
United Engineering & Fdry. Co., First Nat'l Bank Bldg., Pittsburgh, Pa.

SAWS (Metal Cutting Power)
Armstrong-Blum Mfg. Co., 339 N. Francisco St., Chicago, Ill.
Youngstown Sheet & Tube Co., Youngstown, O.

SCALES
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Fairbanks, Morse & Co., 900 So. Wabash Ave., Chicago, Ill.

SCALES (Dial)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.

SCREENS AND SIEVES
Buffalo Wire Works Co., 437 Terrace, Buffalo, N. Y.
Harrington & King Perforating Co. 5634 Fillmore St., Chicago, Ill.
Wickwire Spencer Steel Co., 41 E. 42nd St., New York City.

SCREW MACHINE PRODUCTS
Hindley Mfg. Co., Valley Falls, R. I.
Progressive Mfg. Co., Torrington, Conn.

SCREW STOCK—See STEEL (Screw Stock)

SCREWS
Progressive Mfg. Co., Torrington, Conn.

SCREWS (Machine)
Progressive Mfg. Co., Torrington, Conn.

SEAMLESS STEEL TUBING—See TUBES

SEPARATORS
Magnetic Mfg. Co., Dept. TL 650 So. 28th St., Milwaukee, Wis.

SEPARATORS (Sand)
Magnetic Mfg. Co., Dept. TL 650 So. 28th St., Milwaukee, Wis.

SHAFTING
Bliss & Laughlin, Inc., Harvey, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Standard Steel Works Co., Burnham, Pa.
Union Drawn Steel Co., Massillon, O.
Wyckoff Drawn Steel Co., First Nat'l Bank Bldg., Pittsburgh, Pa.

SHAPES (Steel)—See STEEL (Structural)

SHAPES, SPECIAL (Steel)
Union Drawn Steel Co., Massillon, O.
Wyckoff Drawn Steel Co., First Nat'l Bank Bldg., Pittsburgh, Pa.

SHEARS
Lewis Fdry. & Mach. Co., P. O. Box 1591, Pittsburgh, Pa.
Morgan Engineering Co., Alliance, O.
Thomas Spacing Machine Co., Pittsburgh, Pe
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

SHEET BARS
Andrews Steel Co., Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. La Salle St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Youngstown, O.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., Youngstown, O.

SHEET METAL PRODUCTS—See STAMPINGS

SHEET METAL WORKERS MACHINES
Excelsior Tool & Machine Co., Ridge and Jefferson Aves., East St. Louis, Ill.

SHEETS (Acid Resisting)
International Nickel Co., Inc., 67 Wall St., New York City.

SHEETS (Black)
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Newport Rolling Mill Co., The, Newport, Ky.
Parkersburg, The, Iron & Steel Co., Parkersburg, W. Va.
Superior Sheet Steel Div. of Continental Steel Corp., Canton, O.

SHEETS (Corrugated)
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Frick Bldg., Pittsburgh, Pa.
Empire Sheet & Tin Plate Co., Mansfield, O.
Newport Rolling Mill Co., The, Newport, Ky.
Superior Sheet Steel Div. of Continental Steel Corp., Canton, O.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., Youngstown, O.

SHEETS (Deep Drawing and Stamping)
Alan Wood Steel Co., Conshohocken, Pa.
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Frick Bldg., Pittsburgh, Pa.
Empire Sheet & Tin Plate Co., Mansfield, Ohio.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Newport Rolling Mill Co., The, Newport, Ky.
Republic Steel Corp., Youngstown, O.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., Youngstown, O.

SHEETS (Electrical)
American Sheet & Tin Plate Co., Frick Bldg., Pittsburgh, Pa.
Empire Sheet & Tin Plate Co., Mansfield, Ohio.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Newport Rolling Mill Co., The, Newport, Ky.
Republic Steel Corp., Youngstown, O.
Youngstown Sheet & Tube Co., Youngstown, O.

SHEETS (Galvanized)
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Frick Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Empire Sheet & Tin Plate Co. Mansfield, O.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Newport Rolling Mill Co., The, Newport, Ky.
Parkersburg, The, Iron & Steel Co., Parkersburg, W. Va.
Republic Steel Corp., Youngstown, Ohio.
Superior Sheet Steel Div. of Continental Steel Corp., Canton, O.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., Youngstown, O.

SHEETS (Heat Resisting)
Driver-Harris Co., Harrison, N. J.

SHEETS (Hot Rolled and Hot Rolled Annealed)
Alan Wood Steel Co., Conshohocken, Pa.
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Frick Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Empire Sheet & Tin Plate Co., Mansfield, Ohio.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Youngstown, Ohio.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., Youngstown, O.

SHEETS (Lead Coated)
Superior Sheet Steel Div. of Continental Steel Corp., Canton, O.

SHEETS (Long Terne)
American Sheet & Tin Plate Co., Frick Bldg., Pittsburgh, Pa.
Newport Rolling Mill Co., The, Newport, Ky.
Republic Steel Corp., Youngstown, O.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., Youngstown, O.

SHEETS (Perforated)
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.

SHEETS (Roofing)—See ROOFING AND SIDING

SHEETS (Tin)—See TIN PLATE

SHEETS (Tin Mill Black)
American Sheet & Tin Plate Co., Frick Bldg., Pittsburgh, Pa.
Empire Sheet & Tin Plate Co., Mansfield, Ohio.
Granite City Steel Co., Granite City, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Newport Rolling Mill Co., The, Newport, Ky.
Republic Steel Corp., Youngstown, O.
Weirton Steel Co., Weirton, W. Va.

SHEETS—HIGH FINISH (Automobile, Metal Furniture, Enameling)
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Frick Bldg., Pittsburgh, Pa.
Empire Sheet & Tin Plate Co., Mansfield, Ohio.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Newport Rolling Mill Co., The, Newport, Ky.
Republic Steel Corp., Youngstown, Ohio.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., Youngstown, O.

SIEVES—See SCREENS AND SIEVES

SILICO-MANGANESE
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Pittsburgh Metallurgical Co., College and Highland Ave., Niagara Falls, N. Y.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Vanadium Corp. of America, 120 Broadway, New York City.

SKELP (Steel)
Alan Wood Steel Co., Conshohocken, Pa.
Illinois Steel Co., 208 S. La Salle St., Chicago, Ill.

SKIP HOISTS (Blast Furnace)
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

SLEEVES
Gifford Engine Co., Lansing, Mich.

SOAKING PITS
Criswell, James, Co., Keenan Bldg., Pittsburgh, Pa.
Surface Combustion Co., 2375 Dorr St., Toledo, O.

SPACING TABLES
Thomas Spacing Machine Co., Pittsburgh, Pa.

SPECIAL MACHINERY—See MACHINERY SPECIAL

SPIEGELEISEN
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

WHERE-TO-BUY

SPIKES (Screw)
Illinois Steel Co.,
208 S. LaSalle St., Chicago, Ill.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
Republic Steel Corp.,
Youngstown, O.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg.,
Birmingham, Ala.
Youngstown Sheet & Tube Co.,
Youngstown, O.

SPLICE BARS (Rail)
Illinois Steel Co.,
208 S. LaSalle St., Chicago, Ill.
Inland Steel Co.,
38 So. Dearborn St., Chicago, Ill

SPRINGS
American Steel & Wire Co.,
208 S. LaSalle St., Chicago, Ill.
Raymond Mfg. Co., Corry, Pa.
Standard Steel Works Co.,
Burnham, Pa.
Washburn Wire Co., Inc., 118th St & Harlem River, New York City.
Wickwire Spencer Steel Co.,
41 E. 42nd St., New York City.

SPROCKETS
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Diamond Chain & Mfg. Co., 455 Kentucky Ave., Indianapolis, Ind.
Link-Belt Co.,
300 W. Pershing Rd., Chicago, Ill.

SPRUE CUTTERS
Shuster, F. B., Co., The,
New Haven, Conn.

STACKS (Steel)—See BRIDGES ETC.

STAMPINGS
Alliance Mfg. Co.,
Alliance, O.
American Tube & Stamping Plant, (Stanley Wks.), Bridgeport, Conn.
Crosby Co.,
183 Pratt St., Buffalo, N. Y.
Geuder, Paeschke & Frey Co.,
1437 W. St. Paul Ave.,
Milwaukee, Wis.
Grammes, L. F. & Son, Inc.,
Allentown, Pa.
Lansing Stamping Co.,
Lansing, Mich.
Raymond Mfg. Co., Corry, Pa.
Stanley Works,
New Britain, Conn.

STAMPS (Steel)
Cunningham, M. E., Co.
107 E. Carson St., Pittsburgh, Pa.

STAPLES (Wire)
Roebling's, John A., Sons Co.,
Trenton, N. J.
Youngstown Sheet & Tube Co.,
Youngstown, O.

STEEL (Alloy)
Alan Wood Steel Co.,
Conshohocken, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co.,
208 S. LaSalle St., Chicago, Ill.
Midvale Co., The,
Nicetown, Philadelphia, Pa.
Republic Steel Corp.,
Youngstown, Ohio.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg.,
Birmingham, Ala.
Timken Steel & Tube Co.,
Canton, O.
Washburn Wire Co.,
Phillipsdale, R. I.

STEEL (Alloy, Cold Finished)
American Steel & Wire Co.,
208 S. LaSalle St., Chicago.
Bliss & Laughlin, Inc.,
Harvey, Ill.
Moltrup Steel Products Co.,
Beaver Falls, Pa.
Union Drawn Steel Co.,
Massillon, Ohio.
Wyckoff Drawn Steel Co.,
First Nat'l Bank Bldg.,
Pittsburgh, Pa.

STEEL (Clad—Corrosion Resisting)
Illinois Steel Co., 208 So. LaSalle St., Chicago, Ill.
Superior Steel Corp.,
3122 Grant Bldg., Pittsburgh, Pa.

STEEL (Cold Drawn)
Kidd Drawn Steel Co.,
Aliquippa, Pa.
Wyckoff Drawn Steel Co.,
First Nat'l Bank Bldg.,
Pittsburgh, Pa.

STEEL (Cold Finished)
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Moltrup Steel Products Co.,
Beaver Falls, Pa.
Pittsburgh Tool Steel Wire Co.,
Monaca, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Union Drawn Steel Co.,
Massillon, Ohio
Wyckoff Drawn Steel Co.,
First Nat'l Bank Bldg.,
Pittsburgh, Pa.

STEEL (Corrosion Resisting)
American Sheet & Tin Plate Co.,
Frick Bldg., Pittsburgh, Pa.
American Steel & Wire Co.,
208 S. LaSalle St., Chicago, Ill.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Driver-Harris Co., Harrison, N. J.
Granite City Steel Co.,
Granite City, Ill.
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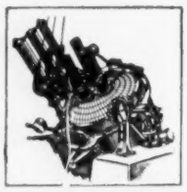

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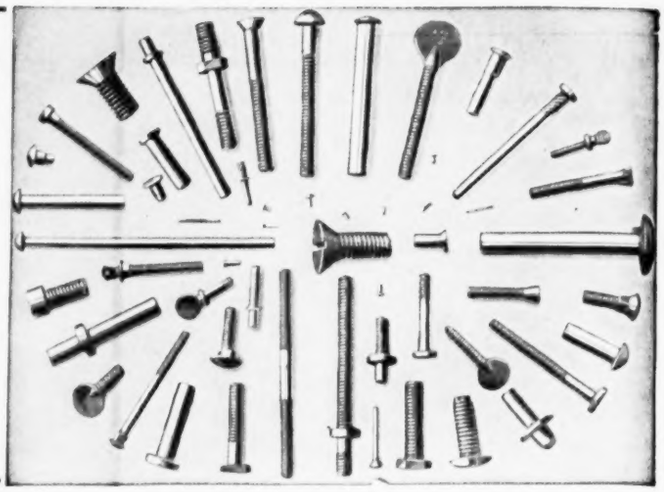

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